

DO WE NEED MEAT? MEAT CONSUMPTION – WHERE DOES IT GO TO?

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Introduction

The aim of this paper is the attempt to answer the question “do we need meat?”. This question can be discussed by nutritional scientific knowledge, statistical data analysing the meat demand and the probable meat consumption in different European countries. As the meat demand is not only a process influenced by prize and income level, but also by emotions, attitudes, motives and knowledge a new psycho-social model explaining the consumers` uncertainty will be introduced.

Nutrient components of meat and nutritional value of meat

Meat and meat products are a rich source of protein, minerals and B-group vitamins including niacin, thiamine (B1), riboflavin (B2) and vitamin B 12 (table 1). They contain essential nutrients, which appear exclusively in meat (vitamin B12) and micronutrients for which meat is the major source because of either high concentration or better bioavailability (selenium, zinc).

Table 1: Nutrient components of meat

Nutrient components of meat				
Per 100 g food	Chicken (breast with skin)	Beef (muscles only)	Pork (muscles only)	Sheep (muscles only)
Energy in kJ	606,8	454,42	442,82	490,5
Energy in kcal	144,6	107,44	105	116,5
Protein in g	22,2	22,0	22,0	20,8
Total fat in g	6,2	1,9	1,86	3,7
Water in g	70,6	75,1	74,7	74,7
Cholesterol in mg	66	58,41	65,26	63,0
Iron in mg	1,1	2,2	1,09	1,6
Zinc in mg	*	4,29	2,00	2,9
Vitamin B 1 in mg	0,07	0,23	0,90	0,15
Vitamin B 2 in mg	0,09	0,260	0,230	0,370
Vitamin B 6 in mg	0,53	0,186	0,565	0,130
Vitamin B12 in µg	4,0	5, 0	2,04	2,7
Niacin in mg	10,5	7,5	5,0	6,2
Selenium µg	6,46	5,24	8,73	4,1

* no data

Source: Souci SW, Fachmann W, Kraut H (1994): Food Composition and Nutrition Tables. Medfarm Scientific Publishing: Stuttgart

Meat is also a high quality protein food with a good balance of essential amino acids. In comparison, plant proteins have lower levels of at least one essential amino acid and so they are considered as lower quality protein. Plant proteins need to be combined to give a more appropriate balance of amino acids.

Modified breeding methods and well-balanced animal food caused a reduction of the fat content in meat during the last years. Beef contains 8,5% fat on average, lean pork cuts (filet, steak, loin) consist of not more than 5% fat and pork cuts with a median fat-content including 6-12% fat. The fat content of poultry without skin is only 0,7%, with skin it makes up 6,2%.

A certain amount of fat in meat is preferable as carrier of fat-soluble vitamins.

In the last years the conjugated linoleic acids (CLA) in meat are of special interest, as CLA have anti-carcinogenic, anti-oxidative and anti-sclerotic effects. CLA can be found basically in meat of ruminants, e.g. in beef 3,1-8,5 mg/g fat, also in milk and dairy products (CMA 2001).

The main type of iron in meat (haem iron) is more efficiently absorbed by the human body than the iron in plant foods (non-haem iron). As much as 15 to 35% of the iron in meat is absorbed - depending on iron stores- compared to 1 to 2% of iron in plant foods. The body will

absorb more haem iron if iron stores are low. The redder the meat is, the higher the iron content.

Iron is an essential mineral found in every cell. It has three key functions in the body: to carry oxygen, to provide chemical reactions and to ensure a healthy immune system. Iron deficiency is the most common nutrient deficiency in the world, affecting mainly older infants, young children and women of child-bearing age. The iron intake is still the weak point in the supply of women of child-bearing age. Their average iron intake is usually distinctly lower than the recommended quantity (DGE 2000).

Zinc is also a component of every living cell in the body. It is essential for the structure and function of over 50 metalloenzymes. It is important for growth and reproduction, night vision, digestion and appetite, sense of taste and smell, for maintaining the body's immunity and for the healing process. Zinc is not widely distributed in foods, so meat is an important source of this micronutrient.

B group vitamins regulate many chemical reactions necessary to maintain health.

Animal products are the only reliable source of the important vitamin B 12, which is required to make new cells and maintain nerve cells. Vegans may become deficient in this vitamin (Biesalski 2002).

It has been claimed for many decades that meat is a risk factor for cancer, especially because of its fat and cholesterol content. But epidemiological data does not confirm this claim. Evidence of the role of meat in human carcinogenesis is weak. It comes from different kind of studies, which can only hardly be compared and come to different answers. For the European context there is no significant evidence for the relation between meat intake and colorectal cancer. Some support for such a relation is available from American studies, but only at the high intake levels of more than 140 g per day. Present international studies analysing meat as risk factor for cancer have to be discussed again regarding evidence based data as shown in the following table 2.

Table 2: Red meat intake and cancer mortality

Country	Red meat intake (kg / person / annum)				Cancer mortality (deaths / 100.000 / annum)		
	Cow	Sheep/Goat	Pig	Total	Large bowel	Prostate	Breast
Austria	23,1	1,1	66,4	90,6	23,5	17,3	21,8
Belgium	21,3	2,0	53,2	76,5	19,2	18,3	25,8
Denmark	2,4	1,0	64,8	86,2	23,3	19,5	27,2
Finland	19,1	0,3	29,4	48,8	13,9	18,1	16,5
France	26,4	4,4	35,8	66,6	20,8	16,6	19,7
Germany	17,8	0,9	54,4	73,1	22,6	16,6	22,1
Greece	20,3	14,4	21,2	55,9	9,5	8,8	15,5
Ireland	17,5	9,8	32,7	60,0	24,8	18,4	26,5
Italy	26,5	1,7	34,2	62,4	19,4	11,4	20,4
Netherlands	18,6	1,3	58,1	78,0	20,1	18,7	26,8
Portugal	17,4	3,5	34,6	55,5	18,8	15,2	18,1
Spain	13,2	6,3	53,2	72,7	16,7	13,5	17,4
Sweden	17,3	0,6	33,4	51,3	15,2	21,1	17,4
UK	16,8	6,8	24,3	47,9	21,1	17,2	27,1

Source: Hill M (2002): Meat, cancer and dietary advice to the public. European Journal of Nutrition (2002) 56, Suppl 1, S. S37

Meat consumption in the UK is less than that in any of the EU Mediterranean countries and yet the colorectal cancer risk is much higher. In Spain, Italy and Greece the total red meat intake is higher, however the cancer mortality lower (table 2).

A large Japanese prospective study even came to the conclusion, that meat is a major protection against gastric cancer. A possible explanation is that meat is only a risk factor for those, who do not eat sufficient amounts of other cancer-protective factors like fruit and vegetables (Hill 2002).

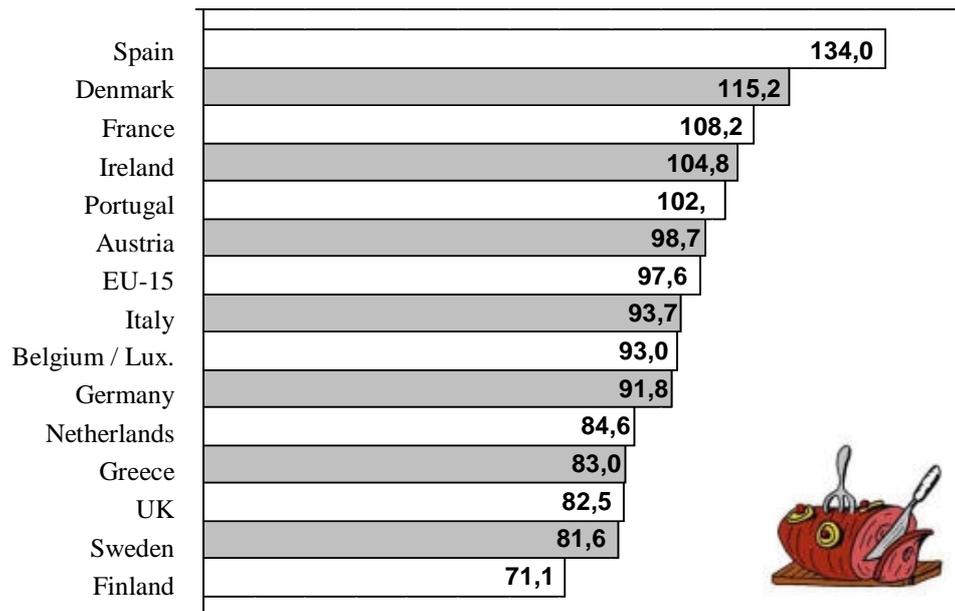
Comprising it can be said that a balanced diet rich in fruits and vegetables, including meat and meat products in moderate quantities (2-3 servings per week) and a

normal body weight as well as a reasonable amount of exercise is a good advice for healthy living and this kind of diet provides the body with macro- and micronutrients it needs. As a nutrient-dense food meat is an important component of the human diet. It cannot be said that meat is per se carcinogenic, one has also to take into account its preparation, if it is fresh or preserved meat, the amount of meat eaten per day and the diet in a whole.

Meat consumption

As figure 1 shows Spain, Denmark, France, and Ireland have the highest meat consumption in the EU-15 countries with over 100 kg per capita per year.

Figure 1: Meat consumption 2003 (per capita intake per year in kg)



Source: ZMP; Agriculture data 2004, report center for market and price, Bonn, Germany, 2004
(ZMP Zentrale Markt- und Preisberichtsstelle GmbH (Hrsg.) (2004): Agrarmärkte in Zahlen. Europäische Union 2004 und EU-Beitrittsländer), p. 19

As table 3 documents meat consumption shows an increasing tendency in all EU-15 countries except in the Netherlands and Portugal where the total meat consumption decreased according to the Food Balance Sheets. However in both of the countries mentioned there was no change in the consumption of sheep- and goats meat during 2001-2003. In Greece the overall meat consumption decreased which is mainly due to a reduction of pork consumption during 2001 and 2003. Nevertheless the poultry meat consumption increased in the same time. The Greeks show the highest per capita consumption in sheep- and goats meat. Comparing France and Germany the pork consumption in Germany is higher than in France. On the other hand the beef and veal consumption in France is more than twice as much as in Germany. As the pork consumption in the United Kingdom stays far behind Germany and France whereas the consumption of poultry meat is higher. After the BSE crises the beef consumption in 2001 and 2003 was higher in the United Kingdom than in Germany. However the

French consume more beef per capita and they are the second largest beef consumers in the EU-15 behind Denmark.

There is no general cluster in the meat consumption of the Mediterranean countries visible, compared to all the other EU-15 member states.

The heading "other meat" includes exotic meat which is imported by EU-member-states e.g. bison imported from the USA, kangaroo from Australia, crocodiles respectively alligators from Australia, Florida and Israel, snakes from the USA or China and ostriches which come from South Africa, Israel, the USA, Australia or even Europe. Additionally frogs and horses are consumed however they don't have to be imported as they can be produced in Europe (DGE 2004).

Table 3: Human consumption, meat, supply balance sheet (kg/ capita/ year)

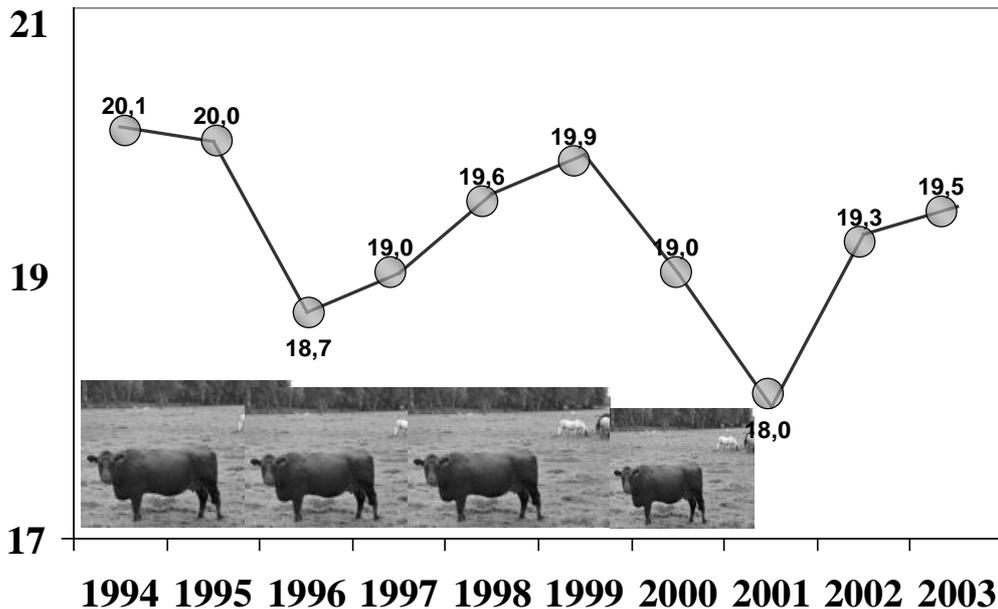
Country	Meat total (incl. Offals)		Beef and Veal		Pork		Sheep- and Goatsmeat		Poultry meat		Other meat
	2001	2003	2001	2003	2001	2003	2001	2003	2001	2003	
Belgium/ Lux.	94,2	(93,0)	20,0	(19,9)	45,9	(45,4)	1,8	(1,7)	17,7	(20,0)	3,6
Denmark	113,9	(115,2)	22,5	(28,5)	63,1	(62,2)	1,3	(1,1)	20,8	(21,0)	0,7
Germany	88,4	(91,8)	10,3	(12,4)	53,8	(55,9)	1,1	(1,0)	18,5	(17,9)	1,5
Greece	91,2	(83,0)	18,7	(17,3)	32,3	(28,6)	13,5	(12,8)	19,6	(20,5)	1,2
Spain	/*	(134,0)	/	(16,0)	/	(67,6)	/	(5,8)	/	(33,0)	/
France	107,2	(108,2)	25,2	(28,1)	36,7	(36,6)	4,2	(4,4)	26,1	(24,0)	5,6
Ireland	/	(104,8)	/	(20,2)	/	(38,4)	/	(5,3)	/	(31,7)	/
Italy	90,5	(93,7)	22,7	(25,2)	37,9	(38,9)	1,6	(1,5)	18,3	(18,0)	4,7
The Netherlands	86,9	(84,6)	19,4	(19,1)	42,6	(41,4)	1,4	(1,4)	22,2	(21,3)	0,2
Austria	97,6	(98,7)	18,3	(18,7)	56,4	(57,7)	1,2	(1,1)	18,3	(17,5)	0,8
Portugal	103,1	(102,3)	14,8	(16,5)	43,7	(43,2)	3,4	(3,4)	31,5	(30,0)	3,4
Finland	63,0	(71,1)	12,3	(17,9)	32	(32,3)	0,3	(0,2)	14,5	(15,5)	2,6
Sweden	73,3	(81,6)	20,6	(24,4)	34,7	(36,3)	1,0	(1,0)	13,5	(14,0)	2,6
United Kingdom	82,6	(82,5)	18,6	(17,2)	25,1	(25,0)	5,7	(6,0)	28,9	(29,5)	0,2
EU-15	/	(97,6)	/	(19,5)	/	(43,8)	/	(3,4)	/	(22,0)	/

Source: ZMP: Agriculture data 2004, report center for market and price, Bonn, Germany, 2004
(ZMP Zentrale Markt- und Preisberichtsstelle GmbH (Hrsg.) (2004): Agrarmärkte in Zahlen. Europäische Union 2004 und EU-Beitrittsländer), pp. 19-42

During 1994 and 2003 the consumption of beef and veal decreased (figure 2). Due to food scares such as BSE and scrapie the lowest intakes were reached in 1996 and 2001. The meat demand recovered after the crises but never reached its level of 1994.

It is not obvious if this development is caused by hard facts like price and income or by qualitative aspects like behavioural determinants as consumer uncertainty.

Figure 2: Beef and Veal intake in the EU-15 (intake per capita in kg)



Source: ZMP: Agriculture data 2004, report center for market and price, Bonn, Germany, 2004
(ZMP Zentrale Markt- und Preisberichtsstelle GmbH (Hrsg.) (2004): Agrarmärkte in Zahlen. Europäische Union 2004 und EU-Beitrittsländer), p. 23

Consumer uncertainty

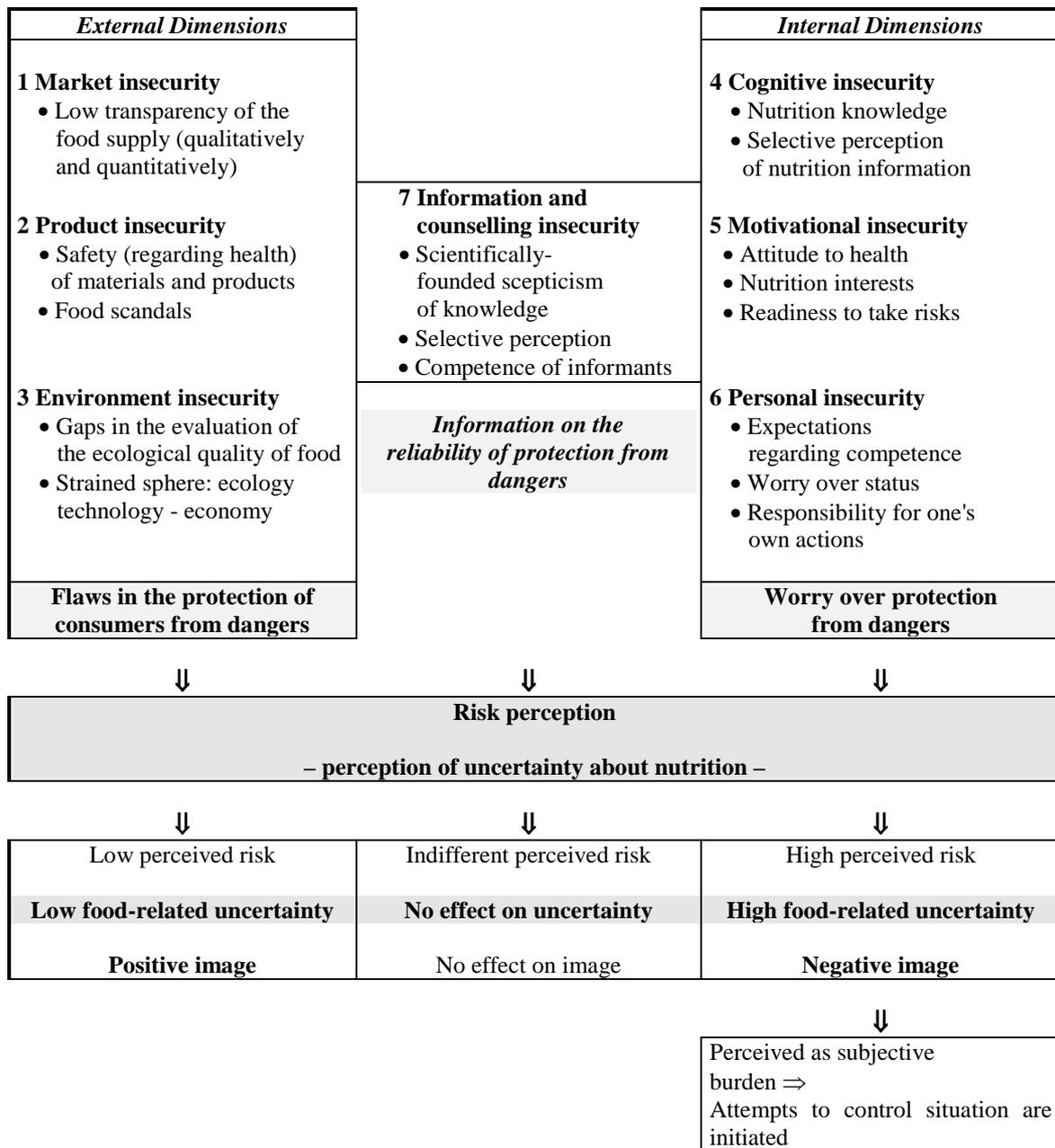
Food-related consumer uncertainty is a major topic of public discussion in different European countries. This uncertainty appears more often in connection with new food products as well as with food processing, food technologies, and food scares. According to representatives of European consumer organisations and

consumer protection food distributed on a global market provides a basis for consumer uncertainty too. Experts state that the underlying reasons are subjective (Chatard-Pannetier, Rousset et al. 2004) and, thus, do not meet the requirements of objective and scientifically-based criteria for influencing the state of health. As systematically conducted studies and data regarding this topic are

lacking, there is an urgent need to explore empirically the phenomenon of consumer uncertainty. On the basis of an empirical study focussed on consumer uncertainty by the

example of convenience food the following model (figure 3) shall be introduced.

Figure 3: Model of food-related uncertainty



Source: Bergmann K (2002): Model of diet-related uncertainty. In: Dealing with Consumer Uncertainty. Public Relations in the Food Sector. Heidelberg: Springer Verlag, p. 40

It puts the dimensions and effects of food related uncertainty into proportions and provides a structural transparency of the phenomenon. Consumer uncertainty is caused by external and internal components. As hypotheses, these are reflected as deficiencies in the protection of consumers. It is modelled with seven sub-areas: Market insecurity, product insecurity, environment insecurity, cognitive insecurity, motivational insecurity, personal insecurity, and information and counselling insecurity (Bergmann, Dorandt, Leonhäuser 2004). The

model describes the complexity of the consumers' behaviour as a research objective and it allows to analyse the meat related decision making process and its different determinants within their probable correlation.

Conclusion

Using statistical data the development and structure of meat consumption in different European countries has been illustrated. Nutritional scientists attest that meat is a good source of protein, readily available iron, calcium,

magnesium, selenium, zinc and a range of B vitamins. Since the evidence for any role in carcinogenesis is weak, the benefits of meat in the diet should not be ignored. The conclusion should be to encourage increased intake of fruit, vegetables and whole grain cereals. If the intake of those products is sufficient, "then there is no need to worry about meat intake" (Hill 2000, p. S40).

In order to be able to reduce consumer uncertainty in the future, a new comprehensive concept for communication between producers, retailers, and consumers is necessary. Food safety and information about the physiological value of meat as part of a balanced and varied diet as well as the traceability with regard to meat production can have a positive effect on the consumers' confidence.

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