CLITRAVI

CENTRE DE LIAISON DES INDUSTRIES TRANSFORMATRICES DE VIANDES DE L'U.E.
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RED MEAT & CANCER: COMMUNICATING THE EVIDENCE



Background

The International Agency for Research on Cancer (IARC), the specialised cancer agency of the WHO, regularly reports on determinants of cancer. Following a meeting in October 2015, a short commentary on red and processed meat (RPM) was published[1]. The full monograph, when published, is likely to stimulate further public debate.

The IARC panel reviewed more than 800 observational studies, mainly relating to risk of colo-rectal cancer (CRC). This is a type of cancer that affects the large intestine (colon) and the rectum. The 2015 commentary made several points about the available evidence as follows:

- Average intakes of RPM worldwide were 50-100g with excessively high intakes defined as those in excess of 200g per day;
- Processed meat and red meat were clearly defined (see Box below);
- Red meat contains high biological value proteins and important micronutrients such as B vitamins, iron and zinc;
- Of the 15 case-control studies which examined CRC, seven reported positive associations with high versus low intakes of red meat. For processed meat, 12 out of 18 cohort studies reported positive associations;
- A meta-analysis of 10 cohort studies found a 17% increased risk for <u>every 100g</u> of red meat consumed daily and an 18% increased risk for <u>every 50g</u> of processed meat consumed daily. Note that these figures represent <u>relative</u> risk (i.e. relative to people who eat lower amounts of RPM), not <u>absolute</u> risk (i.e. actual risk of getting a specific disease);
- For these reasons, IARC graded the evidence relating to processed meat and CRC as 'sufficient' (Grade 1). Other substances/activities within this grading include tobacco and asbestos, but also oral contraceptives, hormone replacement therapy, and working as a painter;
- Due to greater inconsistency, IARC determined that the evidence relating to red meat and CRC was 'limited' (Grade 2a). Other substances/activities within this grading include shift work, very hot drinks, and working as a hairdresser.

<u>Red meat vs. processed meat</u>

WHO defines red meat as unprocessed mammalian muscle meat, i.e. beef, veal, pork, lamb, mutton, horse, and goat meat (both minced and frozen). British sausages and burgers would be included in this category as they are unpreserved.

Processed meat is defined as meat that has been transformed through salting, curing, fermentation, smoking, or other processes to enhance flavour or improve preservation. Most European sausages, except traditional British products, would be included in this category as they typically undergo curing or smoking.

Purpose of this toolkit

Publication of a full monograph on RPM and cancer by IARC is likely to lead to heightened media, health professional and consumer interest. As an organisation committed to evidence-based communication, CLITRAVI has commissioned this toolkit which was developed by a committee represented by member companies and international experts, chaired by dietitian, Dr Carrie Ruxton.

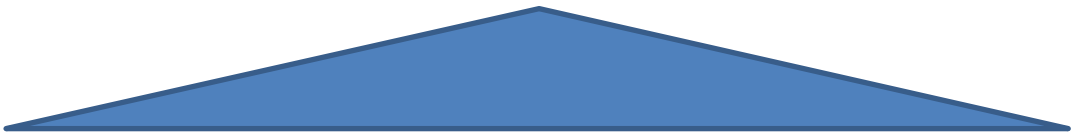
The purpose is to equip member companies with accurate information that can be used in country-specific communications about RPM and cancer, whether in response to questions from external parties, or in proactive communications to key opinion leaders.

The toolkit consists of:

- A message house summarising 6 key messages about RPM and cancer;
- Short statements developed for communications activities. These are presented in different levels of complexity i.e. suitable for the scientific community, healthcare professionals and technical media, or consumers and consumer media;
- Frequently asked questions (FAQ);
- Infographics appropriate for social media, leaflets or websites.

Message house

The following diagram shows, in brief, the key messages that can be communicated in relation to meat and cancer. These are split into primary messages which should be the first ones highlighted in external communications, and secondary messages which can be added if there is an opportunity to comment further. The overarching theme is **'moderate intakes of RPM meat are consistent with good health when enjoyed as part of a healthy, balanced diet and lifestyle'**. Further information is given in the next section.



Primary messages	Average intakes of RPM across Europe are below the excessive levels highlighted by IARC	No direct evidence that RPM *causes* cancer	Real life risk of overconsumption of RPM is minimal compared with other lifestyle factors
Secondary messages	IARC only offers hazard identification which is meaningless in real life	RPM is high in protein and nutrient-rich which means it can contribute to requirements	National food based dietary guidelines recognise the role of RPM in a balanced diet

Primary and Secondary messages

The primary and secondary messages are the following:

1. *Average intakes of RPM (red meat and processed meat) across Europe are below the excessive levels highlighted by IARC;*
2. *No direct evidence that even overconsumption of RPM causes cancer;*
3. *The real life risk of eating **too much** RPM is minimal compared with other lifestyle factors;*
4. *IARC only offers hazard identification which is meaningless in real life;*
5. *RPM is high in protein and nutrient-rich which means it can contribute to requirements;*
6. *Many national food based dietary guidelines recognise the role of RPM in a balanced diet;*

Under the six messages, this section will provide statements that can be used with the scientific community (Level 1), healthcare professionals and technical media (Level 2) or with consumers and consumer media (Level 3).

It should be noted that 'high' RPM intakes are defined by IARC as more than 100g per day, while 'high' processed meat intakes are defined by IARC as more than 50g per day. These levels are typically in excess of what most people in Europe now consume.

The **relative risk** (RR) of an event is the likelihood of its occurrence after exposure to a risk variable as compared with the likelihood of its occurrence in a control or reference group. The RR is estimated as the absolute risk with the risk variable divided by the absolute risk in the control group.
When two different control groups are compared, if the ratio of relative risk between the two group is 1.00, the risk is comparable. A ratio greater than 1.00 between the relative risks of the two groups indicates an **increased risk** for one of the two sample.

"Carcinogenic" is something that can cause cancer. The problem, in terms of communication to the public opinion, is in the verb "to cause". It is not possible to give a deterministic cause-effect interpretation. In other words, it is not possible to say "*if you eat processed meat THEN you will surely get colo-rectal cancer*". In the same way it is not possible to say that if someone is exposed to a carcinogenic agent he/she will certainly get a cancer. As, even if driving a car can increase the risk of die in a car crash, it is not possible to say that driving a car means certainly to die for a car crash. Scientists know very well this reasoning, and "carcinogenic" is something that, taken in certain doses and for a certain period, can increase the risk to develop a certain type of cancer throughout life. In the general interpretation of people, however, if a substance or a food is carcinogenic, this certainly causes cancer. The human being is not good at handling risks and probabilities and somehow refuses them. Everybody surely heard the phrase "*my grandfather smoked up to 90 years of age and never had a cancer*!" to "deny" the idea that smoking causes lung cancer in some way. Or similar phrases

referring to other risky behaviours. Obviously, the case of the grandfather does not deny anything, just as it is always possible to throw a coin 10 times and get every time “head”. However, it is symptomatic of how people do not know how to handle the odds, and they prefer certainties, so one thing is carcinogenic if and only if causes cancer to the single person. Not everyone thinks like that, of course, but it's always something to explain when talking about cancer. An attitude that has the same origin is to think that if we do not eat that food or that carcinogenic substance, then surely, we are safe from that cancer. Unfortunately, this is not true. We may get (and statistically it happens!) a lung cancer even if we do not smoke, and a colon cancer even if we are strictly vegan. No one will ever be able to say with certainty whether, even eating processed meat every single day, we will get a colo-rectal cancer or not. But this does not mean that eating a certain food or not eating it would expose someone to the same risk. All this is well known to specialists, but it must be explicitly reiterated when writing or speaking to consumers.

Moreover, another crucial communication problem is to make clear that the IARC does not classify the various agents based on how carcinogenic they are, nor does it deal with the estimation of the risk, individual or collective, of an exposure to a given agent, once established to be carcinogenic. This means that it is not correct to treat all carcinogenic agents in the same way. Stating that "processed meat is like smoking or asbestos" is deeply wrong and certainly it pays no a service to the public opinion. Carcinogenic agents are different, but it is not the IARC's task to classify this aspect.

Consumers, like most people confronted with a real choice, with the information outlined below, have different reactions. Someone can decide, for example, to continue eating a food because the increased risk is small. As to other foods other people could think that in anyway, both eating them and not eating them the risk changes only a little and there are more dangerous things we can do in life. Other people would think to reduce their consumption. The most important thing is to communicate the risk in a proper way.

1) Average intakes of RPM across Europe are below the excessive levels highlighted by IARC

Level 1:	The relative risks of 1.18 for processed meat and 1.17 for red meat are based on excessively high habitual intakes of 100g and 50g per day, respectively. These intakes are well above what the average European adult consumes. Studies show that in most countries, for which data are available[2], RPM intakes are below 100g, while processed meat intakes are below 50g. For example, in the UK, four in ten men and only one in ten women have RPM intakes above 90g[3]. Data on age-standardised CRC incidence from those countries do not appear to show a trend linking CRC with intake of processed meat. In fact, the incidence of CRC is moderate-to-low in countries with the highest processed meat intakes, such as Germany[4].
Level 2:	IARC based its risk calculations on excessive intakes above 100g for RPM and above 50g for processed meat. It also defined 200g as a high intake of RPM.

	However, studies show that most people in European countries are eating less than this. Rates of CRC incidence do not appear to track intakes of processed meat in Europe – so the countries with the highest processed meat intakes, such as Germany, do not have the highest incidence of CRC.
Level 3:	We have to remember that IARC's risk figures were based on high lifetime intakes of meat, defined as 100g for total red meat and 50g for processed meat. But these levels are higher than what most of us are eating in Europe (insert country name if you have local data). Eating 50g of processed meat equates to 5 slices of salami, or two rashers of bacon, or four slices of ham every day for the rest of your life. That's more than most of us would eat! If your processed meat intakes are below 50g daily, you don't need to be concerned about IARC's findings and can continue enjoying meat in a balanced diet.

2) No direct evidence that even overconsumption of RPM causes cancer

Level 1:	The evidence used for the IARC classification is almost entirely observational. These data cannot be used to determine cause and effect due to the likelihood of confounding factors, especially age and genetic make-up which are two of the largest influencers of cancer risk[5]. Indeed, studies show that high RPM consumers tend to be older, male, more likely to smoke and have less healthy diets overall[6]. Statistical manipulations cannot completely correct for these factors, many of which influence cancer risk. Most observational studies do not correct for low fibre intake or insufficient physical activity, both of which are known risk factors for CRC. All we can say from observational evidence is that there is a *statistical association* between high intakes of RPM and risk of CRC. This association appears to be getting weaker as the latest World Cancer Research Fund[7] report noted a relative risk of 1.12 for red meat and 1.16 for processed meat. Interestingly, in a large UK study, vegetarians had a similar risk of CRC to meat-eaters[8] which suggests that meat is not a major factor in the development of CRC. Indeed, IARC[9] said "*Eating meat has not yet been stablished as a cause of cancer*". Relevant studies have demonstrated that a global assessment of diets, rather than of single foods such as meat and processed meat and its specific components, is needed for effective prevention of CRC[10].

Level 2:	As the majority of evidence is observational, all we can say is that diets which are high in RPM have been associated with an increased risk of CRC. **This does not mean that red meat causes cancer** as you would need more precise studies, such as controlled trials, to determine this. ***Indeed, IARC said "Eating red meat has not yet been stablished as a cause of cancer'***. It is also worth noting that the evidence is not consistent and appears to be weaker in more recent studies. A study in the UK found similar rates of CRC in vegetarians and meat-eaters.
Level 3:	The studies examined by IARC are not controlled enough to pick out any one dietary factor as a cause of cancer. All you can say is there is a 'link', just as there is a link between TV viewing and heart disease. Clearly TVs do not cause heart attacks but people who watch a lot of TV tend to be less active and eat more unhealthy foods. This is probably the case with red meat as high consumers tend to be older, male smokers with higher intakes of alcohol. In any case, overconsumption is a behavioural issue. It means that the hazard is somehow linked to a behaviour rather than to a single food. Safe and moderate consumption of meat is not a hazard. Overconsumption of meat and processed meat is the real hazard, which is an unbalanced lifestyle. Any risk assessment should, therefore, take into account the overall diet and lifestyle rather than a single foodstuff.

3) The real life risk of eating too much RPM is minimal compared with other lifestyle factors

Level 1:	A relative risk of 1.8 means a theoretical 18% increase in CRC cases over and above current risk for those consuming **at least 50g** of processed meat daily **every day**. However, this risk is tiny when put in context with other lifestyle factors, such as tobacco use or obesity. For example, a man smoking more than 30 cigarettes a day will have a 5370% increased risk of developing cancer (relative risk 53.7) than someone who doesn't smoke[11]. An obese person has a 728% increased risk of developing type 2 diabetes (relative risk 7.28) than someone of a normal weight[12]. What does a relative risk of 1.8 mean in practice? The cumulative risk of developing CRC between birth and age 75 years is 3.5% in Europe (i.e. 3.5 cases per 100 people)[13]. This cumulative risk takes into account cases including people who normally eat less than 150g/day of RPM. If all of those individuals ate 50g of processed meat daily for life, the cumulative risk would increase to 4.14% – i.e. less than one case more per 200 people. These figures suggest that the risk derived by increased consumption of processed meat is **extremely small** compared with other modifiable lifestyle factors.
Level 2:	To put the risk of eating high amounts of processed meat in context, we need to compare it with other lifestyle risks. Eating 50g or more of processed meat daily for life raises CRC risk by 18%, according to IARC, but smoking 30 cigarettes a day increases men's cancer risk by 5370%. Taking another example, being obese increases the risk of developing type 2 diabetes by 728%. Around a quarter of people in European countries are obese while only a small proportion of people consume more than 50g processed meat daily. A relative risk of 1,8% translates into a minimal increase in CRC cases. So, if every adult ate more than 50g of processed meat daily (an unlikely circumstance given current intakes in Europe), this would translate into one extra case of CRC per 200 people.
Level 3:	To put the risk of eating high amounts of processed meat in context, consider that eating 7 slices of salami or 2½ rashers of bacon daily for the rest of your life is 298 times less risky than smoking 30 cigarettes a day, and 40 times less risky than being overweight. Therefore, eating moderate amounts of processed meat, which is what most people do, represents a negligible risk to health. **Refer to this useful article about risk** https://patient.info/health/healthy-eating/features/how-much-red-meat-should-you-eat

Secondary messages

4) IARC only offers hazard identification which is meaningless in real life

Level 1:	IARC does **'hazard identification'**, not 'risk assessment'. This means that it only identifies **whether something could cause cancer, but doesn't put the risk in context with either the benefits, or the level of risk posed by normal consumption or use.** This makes hazard identification pretty meaningless in real life situations. Indeed, WHO said: "*It is important to note that IARC do not evaluate the overall risk-benefit profile of compounds in public health terms, even in terms of overall cancer risk for compounds that have a protective effect on some cancers and increase the risk of some others*"[14]. Take one example – the combined oral contraceptive pill – identified as a Level 1 carcinogen by IARC. Clearly, the pill offers benefits to millions of women worldwide, including health benefits, and in the majority of cases of normal use there will be no risk of cancer. However, none of these factors were considered in IARC's assessment, potentially creating alarm. Out of more than 900 substances or activities reviewed by IARC, only one has been assessed as 'probably not' carcinogenic (a compound called caprolactam which is used to make nylon)[15]. Even talcum powder, which is often used on babies, has been labelled 'possibly carcinogenic'.
Level 2:	Unlike other agencies, such as the European Food Safety Authority or the US Food and Drug Administration, **IARC only does hazard identification** which simply states whether or not there is evidence of cancer link. **This process, which doesn't take into account normal consumption/use or risks versus benefit, has resulted in hundreds of substances and normal activities being labelled as potentially carcinogenic**. The list includes hot drinks, the combined oral contraceptive pill, hormone replacement therapy, dying your hair, working as a painter or hairdresser and using talcum powder. **Some scientists have criticised IARC's approach**, complaining that it is outmoded, wrongly places substances with different potencies in the same category (e.g. radiation and working as a painter are both graded as 1), and could potentially lead to health scares[16]. All-too simplistic approaches based on mere hazard identification and classification for carcinogenicity, which have been placing products with widely divergent modes of action and potencies into the same category, are increasingly being criticized as detrimental for both science and society (Boobis et al., 2016).
Level 3:	**IARC doesn't tell us how *potent* something is in causing cancer – only whether it does or not**. That's a problem because it can lead to perfectly normal things being lumped in the same group as very hazardous materials.

	As Professor David Phillips from Kings College London explains: "*To take an analogy, think of banana skins. They definitely can cause accidents but in practice this doesn't happen very often. And the sort of harm you can come to from slipping on a banana skin isn't generally as severe as being in a car accident. But under the hazard classification method used by IARC, 'banana skins' and 'cars' would come under the same category – they both definitely do cause accidents*[17]."

5) RPM is high in protein and nutrient-rich which means it can contribute to requirements

Level 1:	**Unlike tobacco or alcohol, RPM is a valuable source of nutrients in the diet**. Across Europe, more than 90% of people eat RPM. Based on EU nutrition claims, all red meat and most processed meats provide a source of high quality protein. Red and processed meats also provide a source of vitamins and minerals such as B vitamins, potassium, zinc and selenium. (See infographics section for a list of meats and nutrients). The UK's Scientific Advisory Committee on Nutrition[18] determined that average RPM intakes below 70g daily would result in more people with intakes below the Lower Reference Nutrient Intakes for zinc and iron (i.e. a risk of deficiency). This suggests that around 500g of cooked RPM per week is needed to ensure adequate intakes of zinc and iron.
Level 2:	**RPM provide protein and several vitamins and mineral which are important for normal health and growth**. These include B vitamins (energy release, psychological function), potassium (normal blood pressure), zinc (normal immune function) and selenium (antioxidant). The UK's Scientific Advisory Committee on Nutrition advised that, while high consumers of RPM (more than 90g per day) should cut down to 70g per day, intakes below 70g daily would result in more people failing to meet adequate intakes for zinc and iron.
Level 3:	**RPM are protein-containing foods that provide vital vitamins and minerals for health**. These include B vitamins (energy release, psychological function), potassium (normal blood pressure), zinc (normal immune function) and selenium (antioxidant). This means that RPM in moderation can contribute to a healthy balanced diet.

6) National food based dietary guidelines recognise the role of RPM in a balanced diet

Level 1:	**National food-based dietary guidelines recognise the role of RPM in a healthy, balanced diet**. **IARC said: "Eating meat has known health benefits**[19]" while the German Nutrition Society said: "Meat contains minerals and vitamins B1, B6 and B12". For safe consumption of RPM, always observe the use-by dates, avoid cooking meat at high temperatures (even fish and poultry) and aim to have moderate intakes – less than 100g of RPM overall per day, including up to 50g of processed meat. **The World Cancer Research Fund**[20] **recommends up to 500g cooked red meat per week** (or up to 750g raw weight). (Add country-specific guidelines if these apply – see Appendix 1).
Level 2:	**"Eating meat has known health benefits" according to IARC**. Across Europe, national guidelines confirm that RPM can be eaten in moderation as part of a healthy, balanced diet. For example, the World Cancer Research Fund recommends up to 500g red meat per week (cooked weight). The UK government recommends that people eating more than 90g daily of RPM reduce their intakes to around 70g. This is expected to ensure sufficient intakes of zinc and iron which are key nutrients found in RPM. The meatless alternatives (the so called vegetarians and vegans substitutes) are often ultra-processed foods with excessive amounts of salt and additives, whereas several hyped plant foods are currently posing serious environmental concerns (The Telegraph, 2016).
Level 3:	**All European national guidelines advice a balance of nutritious foods which includes RPM**. The contribution of RPM to protein, vitamins and minerals is recognised at moderate intakes of around 500g per week, according to cancer experts. Enjoy RPM safely by observing the use-by dates, keeping meat in the fridge, and avoiding cooking meat at high temperatures (even fish and poultry).[21]

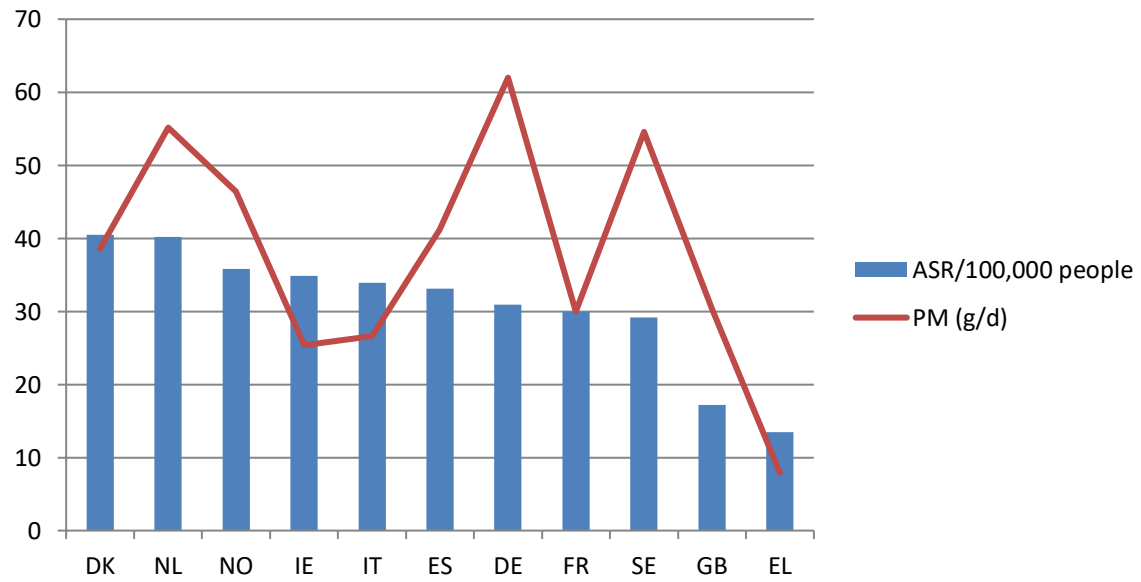
Infographics and resources

Table 1: Intakes of red meat and processed meat by country (g/day)

	Red meat (g/d)	Processed meat (g/d)	RPM (red and processed meat) (g/d)
BE	-	#32.0	-
DE	40.4	62.0 (#47.1)	102.4
DK	56.8	38.6	95.4
EL	35.4	7.9 (#20.0)	43.3
ES	55.9	41.2 (#31.8)	97.1
FR*	44.4	30.0 (#36.6)	74.4
GB	32.3	30.4 (#17.0)	62.6
IE	50.7	25.4 (#35.0)	76.1
IT	49.8	26.6	76.4
NL	52.4	55.2 (#23.0)	107.6
NO*	28.5	46.4	74.9
SE	46.0	54.6	100.6

References: Wyness L et al. (2011) Nutrition Bulletin 36: 34–77.
Note: data for Norway and France available for women only; # data supplied by industry.

Figure 1: Intakes of processed meat (PM) by country (g/day) compared with CRC incidence (ASR)

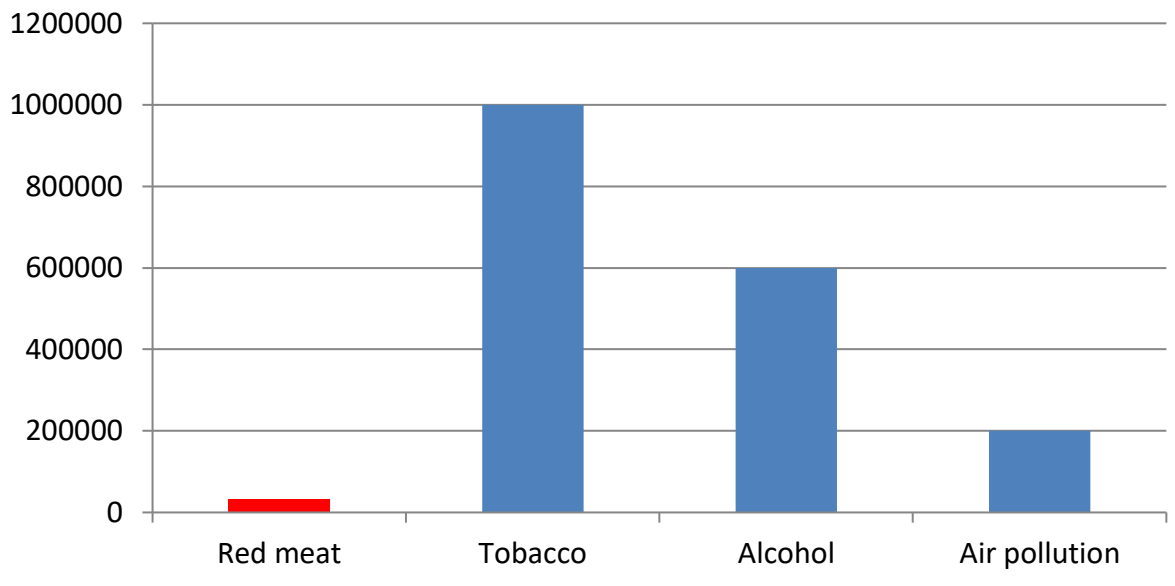


Reference: Meat intakes, Wyness L et al. (2011) Nutrition Bulletin 36: 34–77; age-standardised rate per 100,000 (ASR) http://gco.iarc.fr/today/explore

Note: data for Norway and France available for women only.

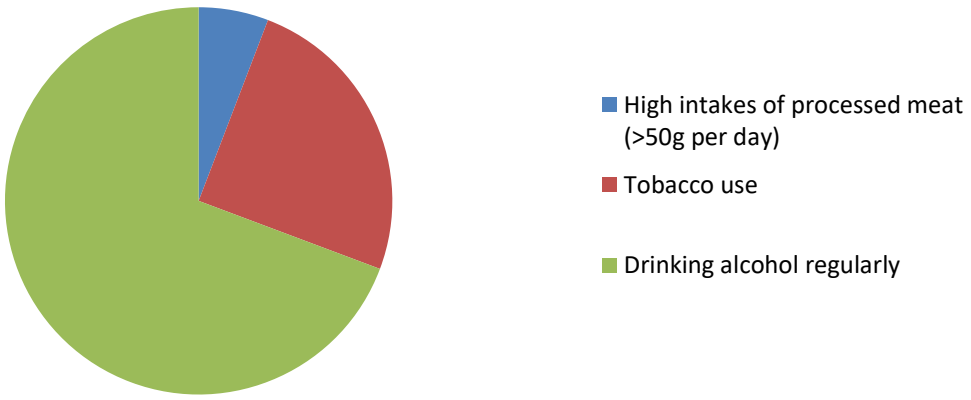
Message (Table 1, Figure 1): *Most European countries have average RPM intakes that fall below 100g per day, and average processed meat intakes that fall below 50g per day*. **Countries with high RPM intakes (Germany, Netherlands and Sweden) do not consistently have high rates of CRC**. For example, Germany has the highest intake of processed meat (62g/day) but a lower CRC rate than Ireland and Italy where processed meat intakes are half that seen in Germany.

Figure 2: Number deaths worldwide attributed to different factors



Reference: Global Burden of Disease Study (2016) https://vizhub.healthdata.org/gbd-compare/

Figure 3: Proportion of colo-rectal cancer cases related to processed meat, tobacco and alcohol



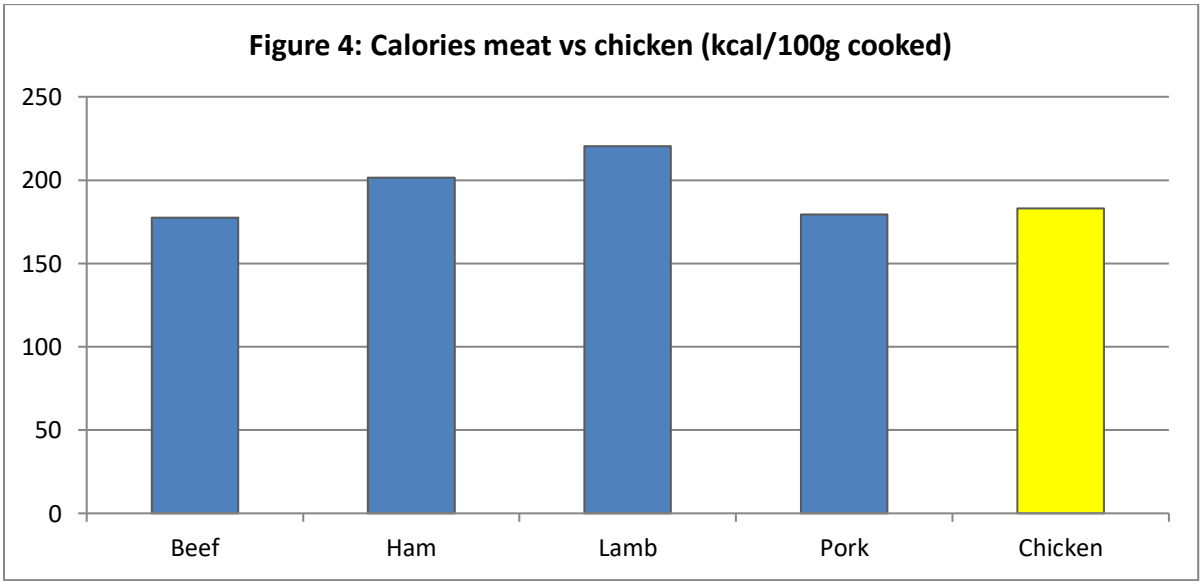
Reference: Global Burden of Disease Study (2016) https://vizhub.healthdata.org/gbd-compare/

Message (Figures 2-3): While RPM gets a lot of coverage for being linked with disease and mortality risk, its theoretical impact pales into insignificance when compared with the impact of tobacco, excess alcohol and air pollution on worldwide mortality. Therefore, the primary focus should be on these preventable issues as this would make far greater improvements to health.

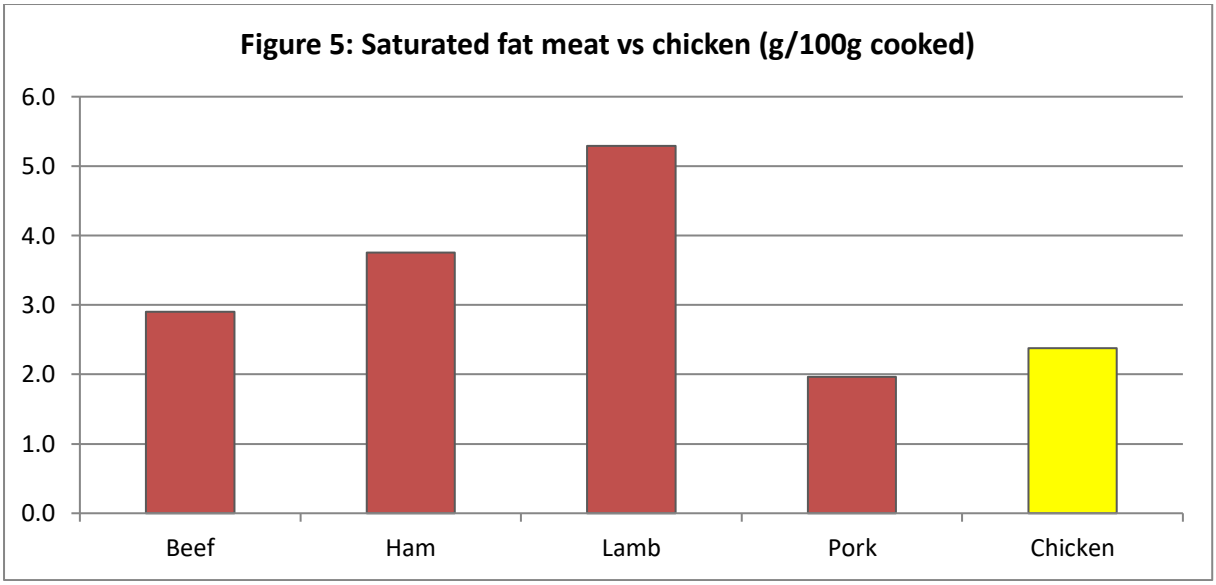
Table 2: What nutrition claims can be made by red meat in general?

	Rich Source	Source	Protein	Sodium	Fat
Beef	Niacin, vitamin B6, vitamin B12, zinc	Riboflavin, iron, potassium, phosphorus	Naturally rich	Naturally low in sodium	No claims possible*
Lamb	Niacin, vitamin B12, zinc	Vitamin B6, potassium, phosphorus	Naturally rich	Naturally low in sodium	No claims possible*
Pork	Thiamin, niacin, vitamin B6, vitamin B12	Riboflavin, zinc, potassium, phosphorus, selenium, pantothenic acid	Naturally rich	Naturally low in sodium	Several cuts of pork are low in saturate fat

Reference: AHDB nutrition claims project, UK. Claims must be based by law on 100g as sold.
*Foods must contain no more than 3g of fat or 1.5g of saturated fat per 100g to make a claim.



Reference: McCance & Widdowson's Composition of Foods integrated database (2015).



Reference: McCance & Widdowson's Composition of Foods integrated database (2015).

Message (Table 2, Figures 4-5): Red meat, especially lean, is a nutritious food. It is officially high in protein, low in sodium and provides an official 'source' of key vitamins and minerals. When red meat is compared with chicken (often viewed as healthier), there is little difference in calories. Pork is lower in saturated fat than chicken.

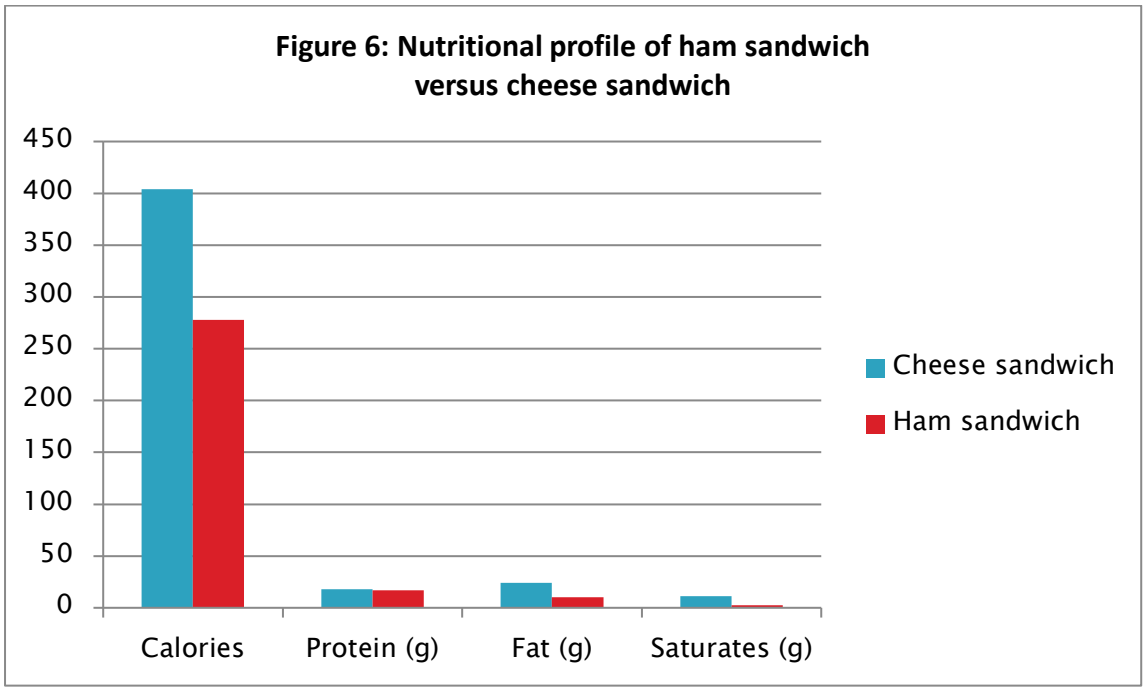
Table 3: What nutrition claims can be made by processed meat in general?

	Vitamins 'source'	**Minerals 'source'**	**Protein/fat**
Gammon raw	Thiamin, niacin, vitamin B12	Phosphorus, selenium	Rich source
Salami	Thiamin, niacin, vitamin B6, vitamin B12	Phosphorus, zinc	Source
Back bacon lean raw	Thiamin, niacin, vitamin B6, vitamin B12	Phosphorus, selenium	Rich source
Frankfurter	Thiamin, niacin, vitamin B12	Phosphorus,	Source
Ham sliced	Thiamin, niacin, vitamin B6, vitamin B12	Potassium, phosphorus, selenium	Rich source/low saturated fat

Reference: McCance & Widdowson's Composition of Foods integrated database (2015). Claims must be based by law on 100g as sold.

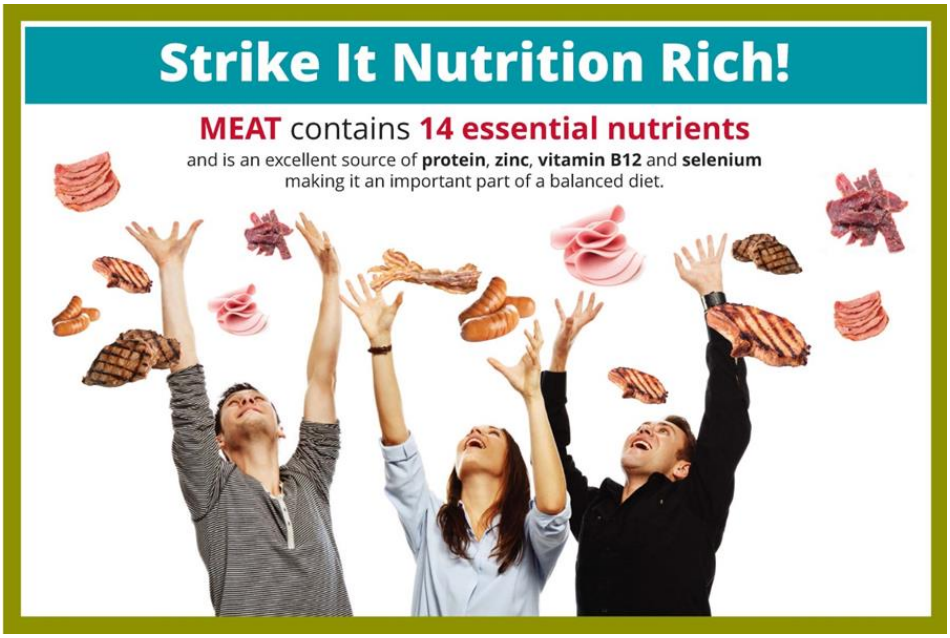
Table 4: Nutritional composition of processed meat

Per 100g	Energy (kcal)	Protein (g)	Fat (g)	Saturated fat (g)	Sodium (mg)
Gammon grilled	199	27.5	9.9	3.4	1430
Salami	438	20.9	39.2	14.6	1360
Back bacon lean grilled	214	25.7	12.3	4.6	1530
Frankfurter	287	13.6	25.4	9.2	730
Ham sliced	107	18.4	3.3	1.1	800

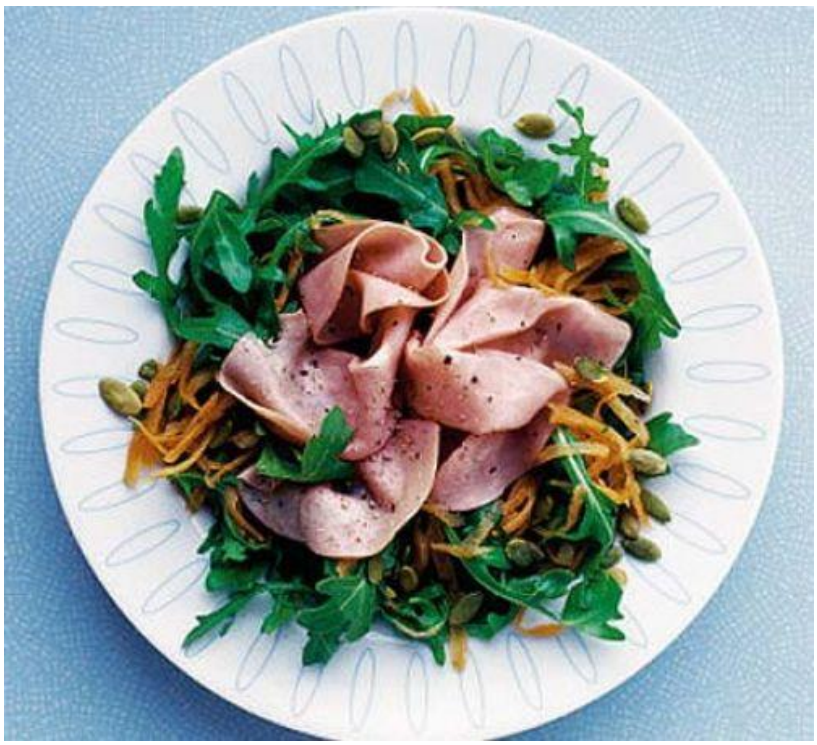


Reference: McCance & Widdowson's Composition of Foods integrated database (2015).

Message (Tables 3-4, Figure 6): PM varies in calories, protein and fat depending on the type. However, it is an official 'source' of several key vitamins and minerals and provides protein. The high fat and high salt content of certain types of PM means that these should be enjoyed in moderation. However, there is no nutritional benefit in switching PM for other high fat foods, such as cheese.



MEAT + VEGETABLES



A NUTRITION DREAM TEAM

IARC Carcinogen Classification

GROUP	MEANING	AGENTS
1	Carcinogenic to humans	118 Includes tobacco, alcohol, and processed meat
2A	Probably carcinogenic to humans	75 Includes anabolic steroids, UV radiation, and red meat
2B	Possibly carcinogenic to humans	288 Includes coffee (urinary bladder) gasoline,and nickel
3	Not classifiable as to its carcinogenicity to humas	503 Includes caffeine, tea, and acrylic fibers,
4	Probably not carcinogenic to humans	1 Caprolactam: common synthetic polymer

Note: coffee was downgraded to 3 (not classifiable) in 2016.

Frequency Asked Questions

What is IARC?
The International Agency for Research on Cancer (IARC) is the specialised cancer agency of the World Health Organization. IARC publishes reports on cancer prevalence, prevention and determinants of cause. IARC produced a short commentary on RPM meat in 2015 but has yet to publish the full monograph.

What did IARC say?
Based on a method of hazard identification which has been criticised by scientists, IARC put processed meat in Group 1 (carcinogenic) and red meat in Group 2A (probably carcinogenic). However, oral contraceptives, hormone replacement therapy, and working as a painter were also placed in Group 1, while shift work, very hot drinks, and working as a hairdresser were placed in Group 2A. This suggests that the grades are not meaningful to how we define and manage risks in life.

How is red meat defined?
IARC defines red meat as "beef, pork, lamb, and goat from domesticated animals, including that contained in processed foods and in most beef burgers" while processed meat is defined as "meat preserved by smoking, curing, or salting, or addition of chemical preservatives. This includes, for instance, ham, bacon, salami, and some sausages such as frankfurters".

What are the differences between fresh and processed meats?
Fresh red meat is naturally low in sodium and does not contain any additives. Processed meat is smoked, cured, salted or chemically preserved in order to control levels of microbes. This is done primarily for reasons of food safety but the processing also delivers particular flavours and textures. This means that processed meat can often be higher in sodium than fresh meat.

Experts say red meat causes cancer – is that right?
No. The majority of evidence is observational and based on intakes of RPM meat that exceed most European countries average intakes. So, all we can say is that diets which are high in RPM meats have been associated with an increased risk of colo-rectal cancer. This does not mean that red meat causes cancer as you would need more precise studies to determine this. Interestingly, a study in the UK found similar rates of bowel/colorectal cancer in vegetarians and meat-eaters suggesting that meat isn't a major cause of this disease.

What are carcinogens?
Carcinogens are substances believed to cause cancer. Examples are cigarette smoke, asbestos and radiation. Many substances that we safely consume, such as fruit, vegetables, treated water and even air contain potential carcinogens. Out of more than 900 substances and activities reviewed by IARC, only one was classed as 'probably not carcinogenic'.

What are nitrates and nitrites?
These are chemicals added during curing processes in order to preserve meat. If these chemicals were not added, the meat would spoil or present a microbiological risk.

Does red meat contain carcinogens?
There is no conclusive evidence that fresh red meat causes cancer. Substances in processed meat, for example nitrates, nitrites and N-nitroso compounds, may be potential carcinogens in large doses, and it is believed that cooking meat, poultry or fish at high temperatures releases heterocyclic amines which may present a cancer risk in large amounts. However, as Cancer UK notes: "The biological reasons for the link between red or processed meat and cancer are still unclear".

Is it safe to eat red meat?
Yes. Using a precautionary approach, the UK's Scientific Advisory Committee on Nutrition determined that intakes of RPM meat up to 70g daily could safeguard our intakes of zinc and iron. IARC based its assessment on intakes of red meat which exceeded 100g per day, and intakes of processed meat that exceeded 50g per day. In most European countries, average intakes are lower than this.

How much red meat do we eat?
Refer to Table 1 to check if your country has published data.

How much red meat should we be eating?
Refer to country-specific guidelines in Appendix 1. Or refer to the World Cancer Research Fund recommendation of up to 500g cooked red meat per week (note however that they do not recommend processed meat). Also, refer to the UK government recommendation that people eating more than 90g daily of RPM meat reduce their intakes to around 70g. This is expected to ensure sufficient intakes of zinc and iron which are key nutrients found in red meat.

Is red meat part of a healthy diet?
Yes. Red meat provides protein as well as key nutrients for health such as B vitamins, potassium, selenium and zinc. In most countries, red meat is viewed by public health experts as part of a healthy balanced diet.

What are the benefits of red meat?
Red meat is a good source of several vitamins and minerals which are needed for normal health. These include vitamin A, thiamin, riboflavin, niacin, vitamin B6, vitamin B12, vitamin D, iron, selenium, iodine, potassium and zinc. Red meat is also rich in high quality protein which contains all the amino acids needed to support the human body.

Is red meat really necessary given that people can live well on vegan diets?
The rich nutrient content of red meat makes it a desirable component of a healthy, balanced diet. It is possible to meet the body's nutritional needs from a vegan diet but it is very difficult and requires planning and cooking skills. For example, vegan diets contain very little vitamin B12 as the only sources are animal foods or certain microbes. They also lack the long-chain omega-3 fatty acids, DHA and EPA. The iron in vegetarian foods is three times less bioavailable than the iron in red meat. Most people choose to eat meat – around 97% according to surveys.

Are all meat products equal to each other?
It is scientifically unacceptable to reduce the vast variability of fermented meats into a single monolithic category. Potential health effects may not be the same for all products[22]. Indeed, existing products vary widely with respect to meat type, fat content, salt concentration, addition of sugar, nitrate or nitrite levels, use of additives, and degree of processing[23].

Is processing a synonymous of non-healthy?
There is no objective reason to equate processing de facto with no healthiness[24]. The word "processing" is defined by the Oxford dictionary as to "perform a series of mechanical or chemical operations on (something) to change or preserve it". It is true that some specific aspects of food processing may indeed be detrimental to health, for example by generating trans fatty acids or reducing the micronutrient availability[25], but this is mostly of little concern in the case of fermented meats. Other processing steps are harmless or may even be beneficial, for instance to allow for preservation or to enhance the bioavailability of micronutrients or other beneficial compounds[26]. Binary oppositions as "processed/natural", of which one term is more highly valued than the other, have been exposed by post-structural theory as mere cultural constructs rather than foundational categories we can confidently rely on. Furthermore, some of the ingredients used to produce meat products have sensory, technological, and especially hygienic safety advantages which is mostly neglected, whereas their potential negative impacts are overstated. For instance, nitrate in fermented meats leads to colour and flavour development as well as enhanced food safety, while these fractions are very small compared to the intake through drinking water or vegetables.

Are meat products an invention of modern times?
No. The production and consumption of fermented meats go back to Antiquity at least, although much older origins may be hypothesized, and they have remained valuable ever since[27]. Fermented meats are therefore an important part of our cultural patrimony. This is especially the case in Europe, where they often have strong connotations of local distinctiveness and artisan pride[28]. In other words, food is more than just a biochemical collection of fuel and nutrients, a vision that is all too often leading to damaging medicalization discourses[29]. Instead, food constitutes a profound part of our identity and cultural heritage, which holds particularly true for meat and its derived products[30] estimated as being among the most precious parts of the human diet. It should be respected and enjoyed as such.

Appendix 1: How national dietary guidelines advise on meat

Country	Recommendation
Austria	The Austrian Nutrition Society (ANS, ÖGE) recommended no more than 3 portions (100-150 g) a week of meat and meat products.
Finland	In 2014 the State Advisory Board for Nutrition in Finland recommended that processed meat products and red meat should not be consumed more than 500 g /week. It is explained that 500 g is the same as 700-750 g of meat in raw weight. Poultry meat is recommended in general, because it is lean and the quality of fat better than fat in e.g. beef and lamb meat. Red meat should be as lean as possible and the salt content as low as possible. There are recommendations for other products as well, e.g. eggs 2-3 per week. The recommendations in Finland mention environmental aspects of food as well. This was made according to the Nordic nutritional recommendations: http://norden.diva-portal.org/smash/get/diva2:704251/FULLTEXT01.pdf
France	The French High Council of Public Health published an amendment in February 2017 to recommend limiting consumption of processed meats and not to exceed 150g per week.
Germany	The German Nutrition Society (DGE) recommended that, as part of a wholesome diet, consumers should not eat more than 300-600 grams of meat and sausages per week. Meat contains minerals and vitamins B1, B6 and B12. The recommendation underlines that, from the health point of view, white meat (poultry) is more favourable than red meat (beef, pork). The DGE advices to rather choose low-fat products, especially with meat and dairy products.
The Netherlands	The Health Council of the Netherlands has recommended that people limit the consumption of red meat, particularly processed meat.
UK	In 2011 the Scientific Advisory Committee on Nutrition (SACN) advised that adults with relatively high intakes of RPM meat (90 g/day or more) should consider reducing their intakes to 70g/day (cooked weight), which was the national average. SACN concluded that a reduction to this level would have little impact on the proportion of adults with low iron and zinc intakes.
UK	The Eatwell Guide is a policy tool used to define government recommendations on eating healthily and achieving a balanced diet. The UK Government in 2016 recommended to 'eat less RPM meat'.

References

[1] Bouvard V et al. (2015) Lancet 16: 1599-1600. www.thelancet.com/journals/lanonc/article/PIIS1470-2045(15)00444-1/abstract

[2] Wyness L et al. (2011) Nutrition Bulletin 36: 34–77.

[3] Department of Health (2011) www.nhs.uk/Livewell/Goodfood/Pages/red-meat.aspx

[4] http://gco.iarc.fr/today/explore

[5] Maki KC et al. (2014) Adv Nutr. 5: 7–15.

[6] Fogelholm M et al. (2015) Eur J Clin Nutr 69: 1060-1065. www.ncbi.nlm.nih.gov/pubmed/25969395

[7] http://www.wcrf.org/sites/default/files/CUP%20Colorectal%20Report_2017_Digital.pdf

[8] Keys T et al. (2014) Am J Clin Nutr 100(suppl): 378S–85S. www.ncbi.nlm.nih.gov/pubmed/24898235

[9] https://www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A_Vol114.pdf

[10] http://cebp.aacrjournals.org/content/25/4/640

[11] www.ncbi.nlm.nih.gov/pmc/articles/PMC3296911/table/T2/

[12] www.ncbi.nlm.nih.gov/pubmed/20493574

[13] www.crcprevention.eu/index.php?pg=colorectal-cancer-epidemiology

[14] www.who.int/reproductivehealth/topics/ageing/cocs_hrt_statement.pdf

[15] http://monographs.iarc.fr/ENG/Classification/

[16] www.sciencedirect.com/science/article/pii/S0273230016303038

[17] www.independent.co.uk/life-style/health-and-families/health-news/cancer-definitely-caused-by-processed-meat-what-you-need-to-know-a6709266.html

[18] www.gov.uk/government/publications/sacn-iron-and-health-report

[19] www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A_Vol114.pdf

[20] www.wcrf-uk.org/uk/preventing-cancer/cancer-prevention-recommendations/limit-red-meat-and-avoid-processed-meat

[21] Leroy F et al. Int J Food Microbiol; in press. https://www.sciencedirect.com/science/article/pii/S0168160518300497

[22] Oostindjer et al., 2014

[23] Toldrá, 2014

[24] Gibney et al., 2017

[25] Cornwell et al., 2018; King and White, 1999

[26] Ribas-Agustí et al., 2017; Weaver et al., 2014

[27] Leroy et al., 2013

[28] Leroy et al., 2015

[29] Fischler, 2013; Lecerf, 2015

[30] Leroy and Praet, 2015