meat advisory panel
Communicating the facts about meat and health

RED MEAT:
CUTTING THROUGH THE CONFUSION

A REPORT BY THE MEAT ADVISORY PANEL

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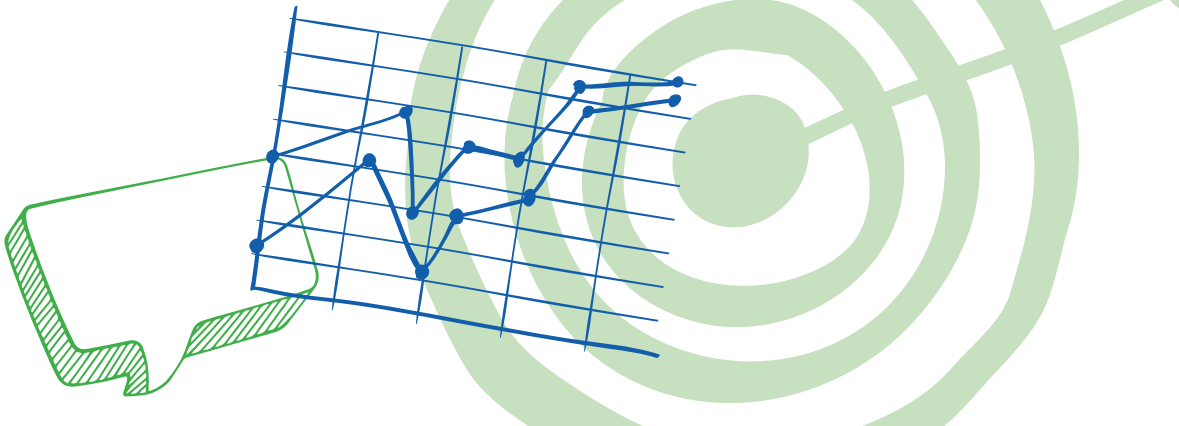

Foreword

A World Health Organisation (WHO) announcement on meat and cancer in 2015 created an outpouring of media headlines claiming, in some cases, that eating red and processed meats posed a similar health risk to smoking tobacco.

Photos of sausages and burgers were accompanied by conflicting statements about risk and health, often prompting a backlash from commentators and readers. At the root of this were fundamental misunderstandings in the media and the public at large about how WHO's expert group, the International Agency for Research on Cancer (IARC), had graded the evidence and what it meant in real life for people.

The alarmist press coverage and resulting confusion prompted WHO[1] to issue a new statement to clarify their original vague comments on risk. This said:

"WHO has received a number of queries, expressions of concern and requests for clarification following the publication of a report from the International Agency for Research on Cancer relating to processed meat and colorectal cancer. The latest IARC review does not ask people to stop eating processed meats but indicates that reducing consumption of these products can reduce the risk of colorectal cancer."

Now that the dust has settled and IARC is gearing up for full publication of their original summary findings, it would seem it's the right time to look back over the evidence linking red meat with colorectal cancer, what the risk means in terms of actual cases, how processed meats should be defined, and how much red meat we should be eating. It is also worth examining what nutrients red meat contributes to the diet and the benefits that this may accrue for people of all ages.

Another reason for a review is the prominence that meat has in the British diet - more than 95% of people in the UK eat meat[2] – and the special role of red meat as a key source of bioavailable iron and zinc in the diet[3]. Therefore, simply accepting and promoting blanket 'eat less meat' messages could have a significant adverse impact on future diet adequacy in vulnerable groups of people and the public's general overall health whatever a person's age. Most of us are short of vital vitamins and minerals to fuel our bodies daily and red meat is well placed to bridge many of these nutrient gaps.

We hope that this report helps cut through the confusion on red meat, diet and health and informs people who choose to eat red meat to enjoy it within a healthy, balanced diet.

The Meat Advisory Panel, London
January 2017

Introducing MAP

The Meat Advisory Panel (MAP) is a group of independent scientists and health professionals tasked to provide objective and evidence-based information about red meat and its role as part of a healthy, balanced diet. MAP is funded by an educational grant from the Agriculture and Horticulture Development Board (AHDB). The members of MAP are:

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How IARC classifies risk

The International Agency for Research on Cancer (IARC), the specialised cancer agency of WHO, regularly reports on causes of cancer. These include chemicals, environmental factors, radiation, exposures at work, medicines and diet.

Each IARC report considers the amount of evidence relating to a substance or activity (called 'agents') and whether or not it may impact on risk of cancer in humans.

The agents are then placed in a classification group as follows:

GROUP 1 **'carcinogenic to humans'.** There are 118 agents in this group. Smoking and alcohol consumption sit within this group as do contraceptive pills, HRT pills and working as a painter.

GROUP 2A **'probably carcinogenic to humans'.** There are 80 agents in this group including creosote, very hot drinks, shift work, glass making and hairdressing.

GROUP 2B **'possibly carcinogenic to humans'.** There are 289 agents in this group including talc, Aloe vera and Ginkgo biloba; all common ingredients in beauty products or foods, as well as digoxin which is a useful drug for heart failure.

GROUP 3 **'not classifiable as to its carcinogenicity to humans'.** There are 502 agents in this group including tea and coffee.

GROUP 4 **'probably not carcinogenic to humans'.** Only one agent out of hundreds has been identified as safe; caprolactam a substance used to make nylon!

BANANAS VS. CARS

The key point about IARC's classification system is that it doesn't tell you anything about the level of risk – how likely it is something will give you cancer. Only, how strong the evidence is to suggest there is a link, regardless of how likely the conditions of the study are.

Professor David Phillips, Kings College London explains: **"IARC does 'hazard identification', not 'risk assessment'. That sounds quite technical, but what it means is that IARC isn't in the business of telling us how potent something is in causing cancer – only whether it does so or not."**

He adds; **"To take an analogy, think of banana skins. They definitely can cause accidents, but in practice this doesn't happen very often (unless you work in a banana factory). And the sort of harm you can come to from slipping on a banana skin isn't generally as severe as, say, being in a car accident.**

"But under a hazard identification system like IARC's, 'banana skins' and 'cars' would come under the same category – they both definitely do cause accidents."

Red meat and cancer: what IARC said

Following a meeting in October 2015, IARC published a short commentary on red and processed meat in the Lancet[4]. The full monograph which details all the research is expected later in 2017.

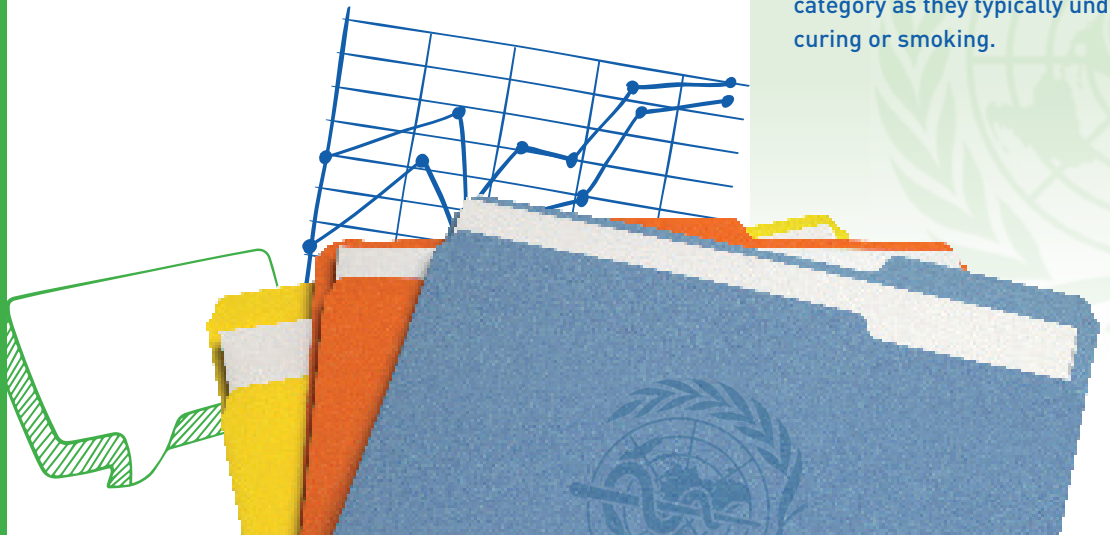
The commentary made several points about the available evidence, which included more than 800 observational studies mainly relating to risk of colorectal cancer (CRC). Observational studies are uncontrolled surveys of large populations where lots of health, diet and lifestyle data are collected and statistics are used to try and find associations between different variables.

As Dr Carrie Ruxton, from MAP, notes: **"Observational studies have one big drawback – they can't be used to establish cause and effect, only correlations. Further studies, such as randomised controlled trials, are needed to do this and to translate the findings of studies into clear public health messages."**

Definitions

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 typically unpreserved.

WHO defines processed meat as meat that has been transformed through salting, curing, fermentation, smoking, or other processes to enhance flavour or improve preservation. European sausages would be included in this category as they typically undergo curing or smoking.



Key points

The key points from the IARC commentary on red and processed meat were:

- Average intakes of red meat worldwide were 50-100 grams per day. High intakes were defined as 200 grams or more daily;
- Processed meat and red meat were clearly defined (see Definitions box);
- Red meat contains high biological value (easily absorbed and utilised) 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 with every 100 grams of red meat consumed daily and a 18% increased risk for every 50 grams of processed meat consumed daily;
- For these reasons, IARC graded the evidence relating to processed meat and CRC as 'sufficient' (Grade 1);
- Due to greater inconsistency, IARC determined that the evidence relating to red meat and CRC was 'limited' (Grade 2a).

Unravelling risk

A risk of 17% sounds a little high but this relates to a theoretical increase in CRC cases for those consuming at least 100 grams of red meat daily. For each 50 gram portion of processed meat daily, the theoretical risk increased by 18%. How would this influence current CRC prevalence and how do these amounts relate to what we typically eat in the UK?

Commenting on this, Professor Pickard, a renowned and leading scientist on human nutrition and dietetics notes: "IARC said that each 50 gram portion of processed meat eaten daily increases the risk of colorectal cancer by 18%. However, the average adult in the UK eats just 15 grams of processed meat a day according to the very latest government data in this country[5], meaning we would need to eat at least three times more processed meat to increase the risk of cancer. This is why I believe that the messaging from IARC which implied an 18% increase in CRC risk with each 50 gram portion of processed meat eaten daily was unhelpful and exceptionally scaremongering.

"We must also remember that the 18% is a theoretical risk over and above your normal risk of CRC. Currently, in the UK, six out of 100 individuals are predicted to develop CRC over a lifetime. If these 100 individuals ate more than 50 grams of processed meat daily, this would increase to seven out of 100 cases. Putting this into context, the risk for smoking is 35 times higher so that out of 100 smokers, 20 are predicted to develop lung cancer. This is why eating meat is nowhere near as risky as cigarettes and those headline writers who said last year that eating meat was as bad as smoking got it badly wrong."

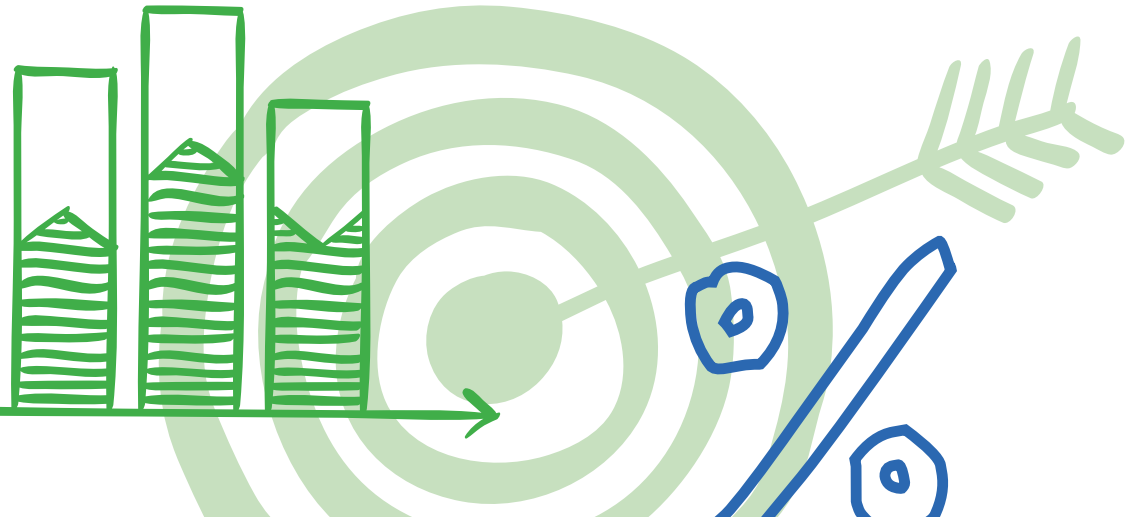


FIGURE 1

Red meat consumption in the UK

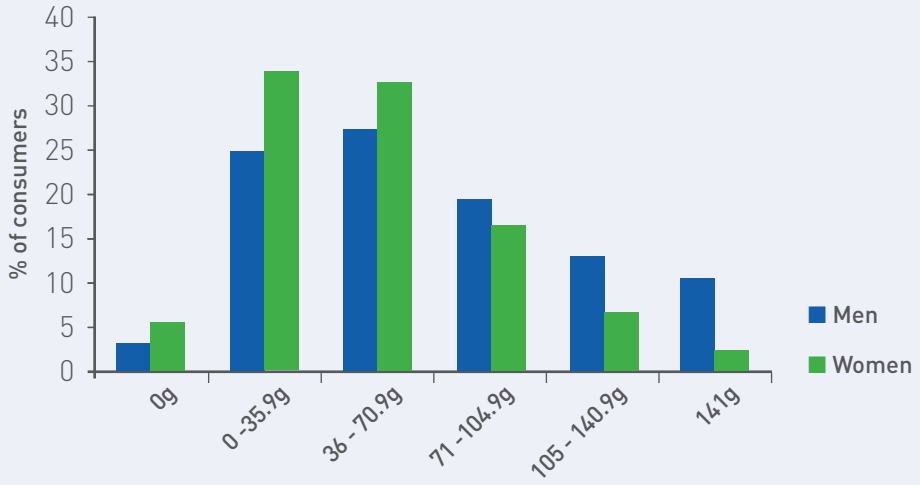


Figure 1 (above) provides a breakdown of the percentage of British men and women eating various amounts of red and processed meat daily[6]. Although the data categories don't exactly match up with IARC's cut-off of 100 grams, it's clear that most adults have intakes which are in a very safe range of consumption, i.e. 1 to 71 grams daily and so we have no need to worry.

How much do we eat?

Dr Emma Derbyshire, from MAP, adds: **"We also need to look at the amounts of red meat that IARC flagged up as a risk and compare these with what the average person in the UK normally eats.**

"The National Diet and Nutrition Survey[3] (NDNS), which is funded by the UK Government, regularly reports on red meat consumption for different age groups. The 2014 publication stated that the average red and processed meat intake in adults is 71 grams (86 grams in men and 56 grams in women). This means that some people currently eat, on average, a third less red meat than IARC's definition of a risky amount."

Red meat consumption also varies widely between different population groups as Dr Carrie Ruxton explains: "**Girls and women generally have much less red meat than men, while young and elderly people eat less than 19 to 64 year olds.**

"For example, average red meat intake in pre-school children is just 30 grams a day rising to 45 grams in 4 to 10 year olds. Teenagers eat 60 grams daily but there is a huge variation between boys (74 grams) and girls (45 grams). People older than 64 years eat 63 grams daily on average with a similar disparity between men's (75 grams) and women's intakes (54 grams)."

"Not only are we eating less red meat than IARC's cut-offs but we are eating less than in previous decades. Government food consumption data shows that red meat intakes have been falling steadily since the 1970s as people have increased their chicken consumption and moved away from traditional meals. Total red meat intakes have fallen by 6% since 2009, and by 25% since 2000."

So, what we know about current intakes of red meat is that the average person in the UK has reduced their consumption over the past few decades, and now eats less than the level identified by IARC as a risk to bowel cancer. The next section looks at what other expert bodies have said about meat and cancer.

Other reports
on meat and cancer

In 2010, the UK's Scientific Advisory Committee on Nutrition (SACN) published a report on Iron and Health[7] which included an examination of links between red meat consumption and risk of colorectal cancer.

SACN trawled through the results from 21 observational studies published since 1996 looking at red meat and CRC, as well as 14 studies which looked at CRC and processed meat consumption. However, SACN were unconvinced by the quality of the data saying: **"It is not possible to discern a clear dose-response relationship, or a threshold level of intakes of red or processed meat associated with increased colorectal cancer risk because of inconsistencies in categorisation and quantification of red and processed meat intake."**

Therefore, SACN couldn't say for sure that higher red meat intakes translated into a greater risk of CRC. For this reason, they concluded that it was 'probable' that high intakes of red and processed meat increased the risk of CRC.

SACN also noted that: **"It is not possible to quantify the amount of red and processed meat that may be associated with increased colorectal cancer risk because of limitations and inconsistencies in the data."**

This means that SACN were unable to identify a particular intake of red or processed meat that clearly increased the risk of CRC and so, could not set a recommendation based on cancer prevention.

Professor Robert Pickard explains what SACN did next: **"Due to the poor data linking red meat with CRC and taking into account the nutritional benefits of red meat in the diet, SACN decided to set a recommended meat intake by finding out what intakes of meat would ensure that most people met their needs for iron and zinc – two minerals in red meat that are essential for normal health. This provided a maximum of 500 grams a week, or 70 grams a day (as cooked weight).**

"As SACN was also keen to manage risk, they recommended that people with high intakes of red and processed meat – defined as above 90 grams a day – consider reducing their intakes to 70 grams daily. Unlike WHO, SACN made no differentiation between red meat and processed meat in terms of risk or recommendations."

Another organisation, the World Cancer Research Fund (WCRF), has produced similar guidance to SACN by recommending that people keep their red meat consumption below 500 grams (cooked weight) per week.

Does meat avoidance **help?**

Taking what SACN said in its report, the evidence linking red meat and CRC is very inconsistent and based on extremely weak observational studies.

However, there is still a risk of around 17% so does this mean that meat avoidance prevents bowel cancer? Information on this comes from long term prospective studies in mainland Europe and the UK which compared the risk of developing CRC in vegetarians and meat eaters.

Cancer screening specialist and MAP member, Roger Leicester, comments: "**Remarkably, given the negative coverage on red meat, it turns out that vegetarians have exactly the same risk of developing CRC as meat eaters, although vegans and fish eaters do benefit from a slightly lower risk due to the protective effects of anti-oxidants in brassica vegetables and fish oil**[8]**.**

"These results suggest that the risk of getting CRC may be due to a clustering of lifestyle factors, rather than a single foodstuff, such as red meat. This view is backed up by studies which reveal that high meat consumers tend to be more likely to be older males who smoke and drink alcohol, and have diets that are low in fruits, whole grains and nuts, and high in oil[9]**. These aspects would cluster to produce a lifestyle that offered very low protection against cancer.**

"Fibre is a particularly important factor in determining risk of CRC yet, as SACN noted, fibre intake was not accounted for in 13 of the 21 studies on red meat and CRC, as well as nine of the 14 studies on CRC and processed meat[10]**.**

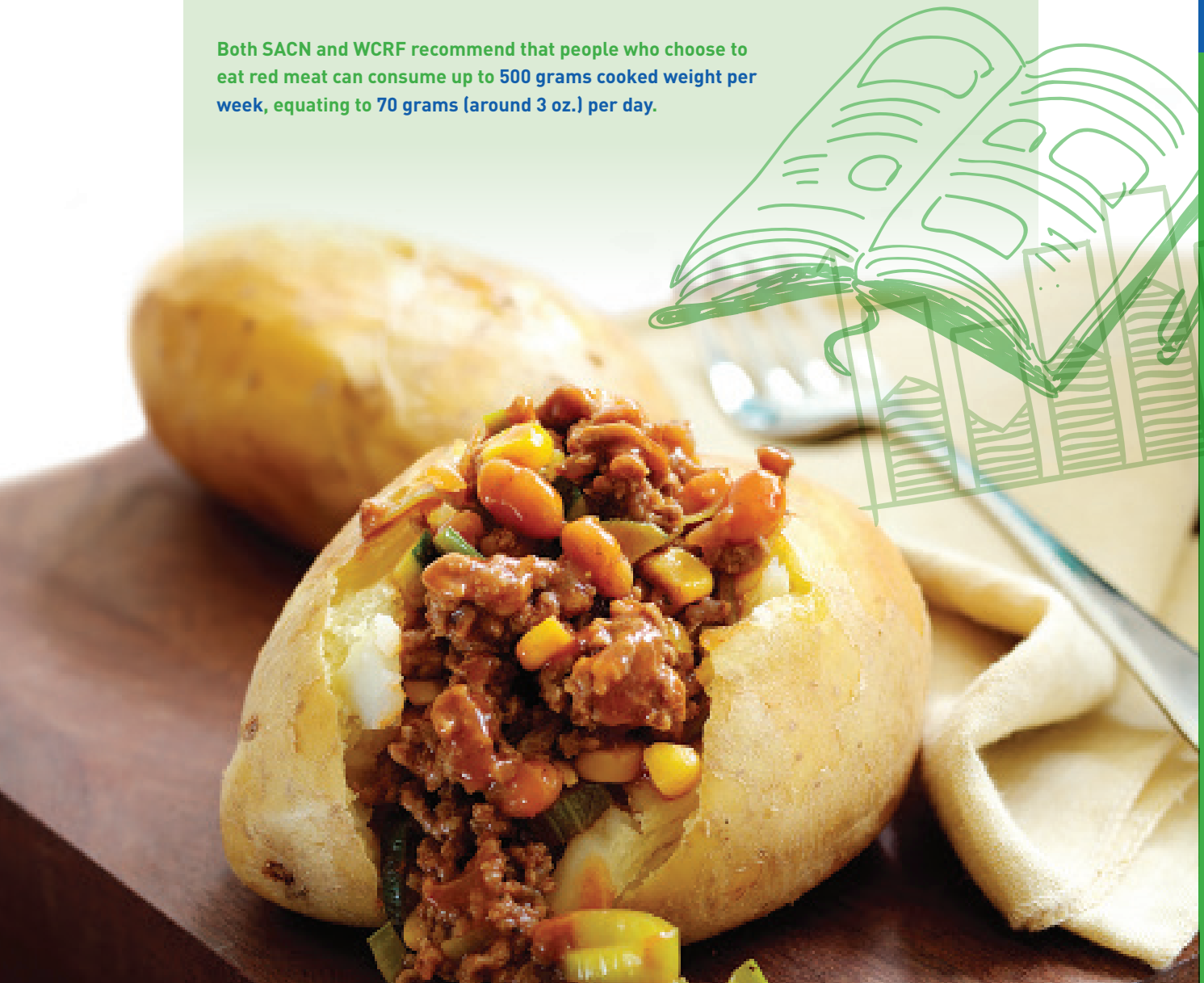
"For processed meat, several mechanisms have been explored such as sodium, nitrites, nitrates or N-nitroso compounds but, as most mechanistic studies have used animal or cell models and there is no scientific consensus, it is not possible to draw firm conclusions."

The final word on this goes to Dr Emma Derbyshire who notes: **"Avoiding meat is a lifestyle choice and may not protect you from getting cancer. We now have consistent guidance in the UK on red meat from both SACN and WCRF which can be easily translated into public health messages and used to inform media articles. Red meat can be eaten and enjoyed by everyone in amounts advised."**

Now read on to find out how we can all enjoy moderate amounts of red meat in a healthy balanced diet.

How much meat is a healthy amount?

Both SACN and WCRF recommend that people who choose to eat red meat can consume up to **500 grams cooked weight per week**, equating to **70 grams (around 3 oz.) per day.**



Red meat
in a healthy diet

Based on the guidance from SACN and from WCRF, we should be aiming for a red meat intake of up to 500 grams a week at cooked weight. This equates to around 750 grams raw meat weekly.

An example of what 500g a week looks like in terms of meals is shown below.

- 1 x 8 oz. (227g) steak
- 1 x 4 oz. (113g) pork chop
- 2 x pork sausages 1.7 oz. (50g) each = 3.5 oz. (100g) loin steaks, fat removed
- 1 x portion Shepherd's pie which contains 2.1oz (60g) of lamb.

The 500 gram limit can be eaten as four or five portions weekly, leaving plenty of days to enjoy fish, chicken, turkey and vegetarian meals.

Dietitian, Dr Carrie Ruxton notes: **"Choosing lean red meat makes a big difference nutritionally as it has a relatively modest fat and saturated fat content and is high in protein. Also, given new advice on boosting fibre intakes and aiming for five portions of fruit and vegetables daily, a meat meal can be a great excuse for doubling up on vegetables. Try adding onions, peas, carrots and red peppers to mince, or creating a healthy pork stir fry with baby corn, green beans and mushrooms."**

"How you cook meat, but also poultry and fish, impacts on healthiness. Avoid burning or charring as this boosts levels of heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs) both of which have been linked with cancer in animals. To ensure lower fat intakes, grill, stew or oven bake rather than fry and choose vegetable oils instead of butter or lard."

As Table 1 shows (page19), commonly eaten red meats are lower in fat than ever before thanks to advancements in animal breeding and feeding, as well as the skill of butchers who can remove most of the visible fat. Many cuts of meat are now only 4 to 10% fat and some cuts of pork and beef contain 2% of saturated fat or less putting them in the same league as chicken and cottage cheese.

Meal planning

There is no need to avoid meat at specific times of the week or month as this wrongly infers that there is something nutritionally inferior about meat. Keeping within the official advice of 500 grams of lean red meat weekly and eating this within a balanced diet rich in fruit, vegetables and whole grains is the best way to stay healthy.

Commenting on meal planning, GP, Dr Gill Jenkins, comments: **"Yes, there are some people who need to reduce their meat intake – four in 10 men but only one in 10 women according to Department of Health figures[12] – but there are plenty of women and teenage girls who could do with eating a bit more. At present, two in five women eat less than 35 grams of meat daily which is half the amount flagged by SACN as providing sufficient amounts of iron and zinc.**

"We know that intakes of iron in particular are low in women's diets. For example, the NDNS reports that 21% of women aged 19-64 years and 45% of girls aged 11-18 years have iron intakes which fail to meet minimum recommendations for normal health. In addition, 10% of women and 7% of girls have low haemoglobin levels increasing their risk of anaemia[13]. Lean red meat is one of the best ways to address this due to the high bioavailability."

TABLE 1:

Energy and fat content of typical lean meats (per 100g cooked)

	ENERGY (KCAL)	FAT (G)	SATURATES (G)
BEEF:			
EXTRA LEAN MINCE	137	4.2	1.8
STEWING STEAK	185	6.3	2.3
TOPSIDE	175	5.1	2.1
LAMB:			
LEG STEAK	198	9.0	3.6
LOIN CHOP	213	10.7	4.9
MINCE	208	12.3	5.9
PORK:			
DICED	184	6.4	1.9
LOIN CHOP	170	4.0	1.5
MINCE	182	5.5	1.9

Source: McCance and Widdowson's Composition of Foods[11]

Packing a nutrient punch

Apart from iron, red meat is also a valuable source of many other nutrients, listed below:

BEEF is a source[14] of riboflavin (vitamin B2) and phosphorus and a rich source[15] of niacin (vitamin B3), vitamin B6, vitamin B12 and zinc. Some cuts of beef are a source of iron and the type of iron present in red meat, called haem iron, is three times more bioavailable than the iron found in plant foods or fortified foods.

LAMB is a source of phosphorus and a rich source of niacin, vitamin B12 and zinc.

PORK is a source of riboflavin and phosphorus and a rich source of thiamin (vitamin B1), niacin, vitamin B12 and zinc.

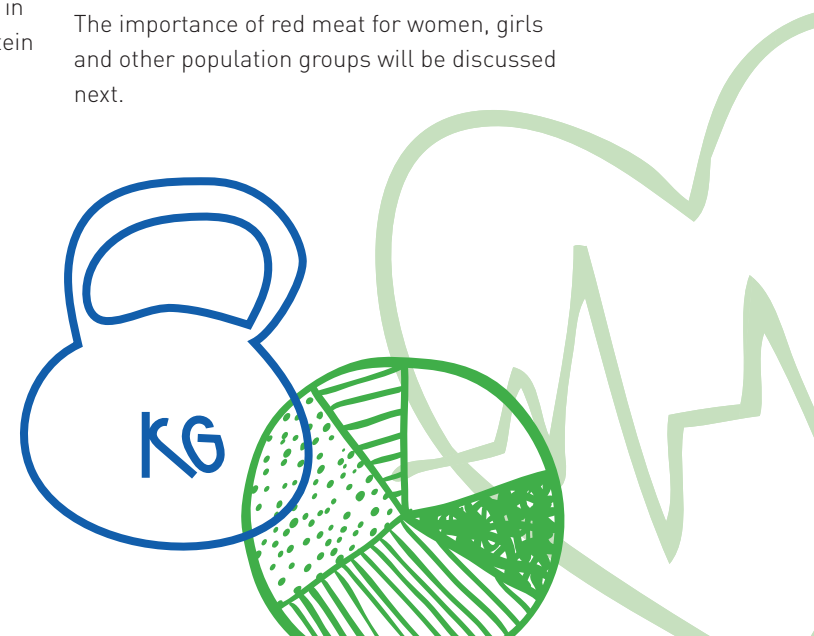
Other nutrients found in useful amounts in red meat include vitamin D, selenium and magnesium. Red meat is also officially 'high' in protein and provides all the amino acids (protein building blocks) needed to support health.

UNINTENDED CONSEQUENCES

However, official advice on red meat can still be confusing despite the clear recommendations from SACN and WCRF. Professor Robert Pickard notes: **"Given that our current average intake of red meat is almost bang on the recommended 70 grams per day, the new Eatwell Guide bizarrely gives a blanket message to 'eat less red meat[16].' It would have been much better to simply state the recommended 70 grams to avoid confusing people who are already within this limit.**

"General eat less messages could have the unintended consequence of encouraging women and girls to eat less meat and therefore reduce their chances of getting enough bioavailable iron in the diet."

The importance of red meat for women, girls and other population groups will be discussed next.



Nutrition and the seven ages

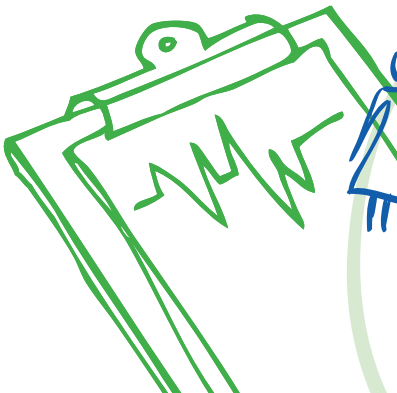
While a minority of people in the UK (5%) choose to avoid meat, for the majority there are recognised nutritional advantages to regular consumption, for example high biological value protein, iron, zinc, B vitamins and selenium.

Red meat provides a quarter of vitamin D in the diet for adults and children[3]. This is even more important nowadays, given that government recommendations for vitamin D have recently been raised to 10 micrograms per day for the whole population.

Dr Carrie Ruxton, who co-authored the paper, said at the time: **"Meat has long played a central role in the human diet and is now recognised as an important source of high-quality protein and essential micronutrients. The research indicates that even in developed countries such as the UK, with a plentiful food supply, there is evidence of under-consumption of key vitamins and minerals which support long-term health. It is notable that many of these are present in red meat, such as iron, vitamin A, vitamin D, selenium, magnesium, potassium and zinc.**

"Integrating red meat into diets across the age spectrum, from infanthood to old age, can help to narrow the present gap between intakes and recommendations. In addition, there is emerging evidence that nutrients commonly found in red meat may play a role in supporting cognitive function, immune health, and addressing iron deficiency.

"Moderate amounts of lean red meat provide a wide range of important nutrients, without substantially increasing intakes of energy and saturated fat. When consumed in moderate amounts as part of a balanced diet, lean meat is unlikely to increase the risk of chronic disease yet provides an important source of micronutrients. In addition, people who eat lean meat regularly tend to eat more vegetables, fruits, low-fat dairy products and have a higher intake of nutrients overall, suggesting that inclusion of red meat does not displace other important foods."



A review study in Nutrition Bulletin[17] considered the nutrients present in red meat and aligned this with known dietary gaps at different life stages. For example:	
INFANTS AND PRE-SCHOOL CHILDREN	Studies show that diets in this age group are low in vitamin A, vitamin D, iron, zinc.
PRE-PUBESCENT CHILDREN	Diets were found to be low in vitamin A, magnesium, iron and zinc. Boys tended to have higher intakes of iron and thiamin than girls.
TEENAGERS (13 TO 18 YEARS)	Diets are low in many key nutrients including vitamin A, vitamin D, iron, magnesium, zinc, selenium and potassium.
ADULTS OF REPRODUCTIVE AGE (19-50 YEARS)	Diets, particularly for females, fall short in magnesium and iron, as well as zinc, selenium and potassium.
PREGNANCY AND LACTATION	Women on average fail to get enough calcium, magnesium, iron, iodine, selenium and potassium and vitamin D.
MIDDLE-AGE AND OLDER AGE (50 YEARS AND ABOVE)	While this group have better quality diets, there are still shortfalls in intakes of magnesium, zinc and potassium.
OLDER-AGE (75 YEARS AND BEYOND)	Data shows that in adults aged over 85, intakes of magnesium, zinc and potassium are below the recommended nutrient intake.

Other papers authored by the MAP team have also highlighted the important role of red meat in the diet of everyone who chooses to eat it. These include:

A review in **Nursing Standard**[18] that analysed the nutrients present in red meat and what one portion could contribute to daily vitamin and mineral recommendations.

A paper in **Complete Nutrition**[19] which considered the valuable role of red meat in young children's diets and looked at barriers preventing parents from introducing red meat into weaning and pre-school diets.

Moving up the age range, a review in **Network Health Dietitian**[20] examined the potential contribution of red meat to the diets of teenagers, which are notoriously low in key vitamins and minerals.

At the other end of the spectrum, **Nursing in Practice**[21] published a paper which suggested that the high protein content of red meat could help older people to reduce their risk of sarcopenia – a muscle wasting condition linked to old age.

Protein is not just important for older people but is a key consideration for athletes. A paper in **Network Health Dietitian**[22], co-authored by sports dietitian Rin Cobb, considered protein requirements for different sports and flagged up the role of red meat in the diet.

Finally, a review article in **Complete Nutrition**[23] focussed on the lack of iron in the diets of several groups of people, particularly women and the health consequences of this. The role of red meat as a source of the most bioavailable type of iron was discussed. A new article in Complete Nutrition also shows how red meat can be eaten within weekly meals without exceeding guidelines. Examples of typical portion sizes are provided to help people keep on track with how much red meat they are eating[24].

All of these papers are available on request from the MAP team. Just email **AHDBNHC@nexuspr.com**

Conclusion

This report has looked in detail at reports on red meat and cancer from IARC, SACN and WCRF. It is hoped that the objective information provided will help to inform future discussion and ensure that consumers who choose to eat meat receive the best available advice.

Three points stand out clearly from the meat and cancer debate. The first is that, due to the inconsistent evidence on meat and cancer, a lack of confirmed mechanisms and the risks identified (one extra case per 100), there is nothing to suggest that eating red meat in line with the 70g a day cooked weight impacts negatively on health. The second point is that people in the UK are now consuming this recommended amount on average, having lowered their meat consumption from around 140 grams daily several decades ago. The third point is that the risky levels of meat consumption identified by IARC, i.e. 100 grams of total red meat daily or 50 grams of processed meat, are far higher than the amounts of meat currently being eaten daily in the UK. For example, the average UK adult eats just 17 grams of processed meat a day.

It is true that four in ten men should reduce their intakes but also the case that some women and girls could be encouraged to eat more red meat to boost iron and zinc status. Dietary intakes could also be improved by encouraging a preference for lean meat and home cooking over higher fat, higher calorie ready-to-eat options such as pies and composite meat products.

The fat content of carcase meat has significantly reduced in recent decades and now ranges from 4-8% for popular beef and pork cuts as shown in Table 1.

Processed meat should not be over-consumed above the recommended daily red meat intakes. SACN deliberately did not make separate recommendations for processed meat but it is good dietary practice to encourage individuals with high intakes (more than 50 grams a day) to switch to non-processed options.

All of this suggests that a targeted approach is needed to ensure that the right amounts of meat, and the right types, are selected by those who wish to eat it. A blanket 'eat less' message to everyone seems wholly inappropriate and could have the unintended consequence of negatively impacting on the iron status of women and girls. Remember, low iron intake is already a problem in up to 40% of females while one in ten have poor iron status.

As well as confusion about how much meat consumers can eat, the waters are muddy on what constitutes processed meat. This has led to the great British banger featuring on front pages under headlines about processed meat. Unlike in other European countries, burgers and sausages in the UK are not classified as 'processed meats' as they don't undergo curing or smoking. However, depending upon the recipe, they may still be high in fat and salt and should be considered occasional foods.

In **conclusion**, red meat can make a very positive contribution to the diet and, for most people, intakes don't have to be reduced.

Avoiding red and processed meat in the diet is not a protective strategy against cancer. Red and processed meat do not give you cancer.

The top priorities for cancer prevention remain smoking cessation, maintenance of normal body weight and avoidance of high alcohol intakes.

Choosing a meat-free diet is a lifestyle choice. Red meat has a valuable role within a healthy, balanced diet thanks to its high protein content and rich nutritional composition.

Indeed, some groups such as women, girls and pre-school children, could eat more red meat to access the many nutritional benefits, such as iron, B vitamins, vitamin D and selenium.

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