Meat and fish are the ultimate quality, staple foods and occupy a preeminent place in the composition of our meals. When naming the main dish, it is common to only mention the meat or fish, with the accompanying pasta, rice or vegetables being considered as side dishes.

There is nothing better than grilled meat cooked to perfection – rare, medium or well-done. What better way to taste the best cuts of meat or fish, deliciously cut up and marinated? Simple, diverse and original.

OptiGrill™ is the ideal grilling tool: a grill which guarantees successful cooking exactly as you like it from a well-known brand name in grills.
Meat is an important part of a balanced diet, representing a good source of animal proteins, vitamin B12 and iron in particular.

Fish is a good source of proteins, phosphorous and sélénium.

Meat consumption is changing differently around the world. It is determined by socio-demographic and economic factors, as well as cultural and religious factors.

For instance, a strong increase in demand for animal products is being recorded in regions which traditionally consumed vegetables (particularly Asia). The trend in developed countries, meanwhile, is towards a stabilisation or even a reduction in consumption, although consumer demand for quality ingredients, particularly meat, is stronger than ever.

Fish is currently an important source of animal proteins in many parts of the world and its consumption is constantly increasing. Aquaculture production is increasing sharply to meet this demand. Over the next decade, total production from capture fisheries and aquaculture are set to overtake production of beef, pork and poultry.
Due to their high nutritional density, meat and fish constitute an important food group which should be included in our regular diet.

**MEAT**
- proteins
- iron
- vitamin B12

**FISH**
- proteins
- omega 3 (oily fish)
- selenium

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**Iron**
It is necessary for the synthesis of haemoglobin, the characteristic pigment contained in red blood cells which allows oxygenation of our cells.

**Vitamin B12**
This vitamin is known for its role in the formation of red blood cells. This vitamin contributes also to the normal function of the immune system.

**Proteins**
These play an essential role in the body by helping increase muscle mass and maintaining normal bone structure.

**Omega 3**
These essential fatty acids contribute to the normal functioning of the brain.

**Selenium**
An antioxidant which also contributes to the proper functioning of the immune system.

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**Nutritional benefits**

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The choice is clear! When you decide to treat yourself to a high-quality product, you naturally want to preserve all of its properties as much as possible so that you can maintain your health while eating a delicious meal!

That is why Tefal® has developed OptiGrill™, an optimised tool for cooking meat and fish, offering optimum performances tailored to each product to ensure it is cooked to taste for maximum pleasure and satisfaction.

Its various programmes mean that OptiGrill™ can offer a cooking style tailored to each product family: poultry, red meat, fish, burger or sandwich/panini.

This makes it simple for consumers to vary their protein intake, safe in the knowledge that their food will be cooked to perfection, whatever the product chosen!

Encouraging variety means promoting a balanced daily diet!

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Pre-programmed settings are offered for every different type of food and grilled meal to ensure an optimal result: automatic temperature function and cooking settings controlled and adjusted by an automatic sensor according to the thickness of the item to grill. You can also switch to manual mode with a mixed temperature, to customise the grilling of your vegetables or even your fruit.

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**COOKED TO PERFECTION**

**A CHOICE OF 6 PROGRAMMES**

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Simplified technology to eliminate common cooking problems, such as items being badly placed at the start of cooking or carbonised at the end of cooking, overcooked and too dry or undercooked. The temperature is set precisely to brown the meat and sear its surface, then cook it gently and preserve its tenderness.

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Perfection available to everyone. An exclusive grilling technology limiting the development of toxins on the surface.

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OptiGrill™ makes controlled cooking of meat and fish accessible to everyone to entice the taste buds of food lovers! Tefal® therefore makes cooking your grills simple and delicious.

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**Recommendations for protein*-based food consumption by country**

**CANADA**
Canada’s Food Guide

- 1 portion: 75g of meat, fish, poultry or two eggs, ½ cup of raw, dry vegetables

**UNITED KINGDOM**

- The eatwell plate
- PNNS / National nutrition and health programme
  - Meat and poultry, fish and eggs: 1 - 2 times / day
  - 1 tv at least twice a week

**FRANCE**

- PNNS / National nutrition and health programme
  - Meat and poultry, fish and eggs: 1 - 2 times / day
  - 1 tv at least twice a week

**UNITED STATES**

- chooseMyPlate
  - 1 portion: 65g of meat, 80g of poultry, 100g of fish or 150g of cooked, dry vegetables

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* For the countries (excluding France) listed in this table, foodstuffs which are a source of protein include those derived from animal protein (meat, fish and eggs) as well as those derived from plant protein, such as dried vegetables, legume-based products and nuts.
**CONTROLLED AND RELIABLE COOKING**

When you treat yourself to a high quality piece of meat or fish, one thing you don’t want is to spoil its cooking! However, meat and fish are delicate foods and cooking them is difficult to control with traditional kitchen tools, whose power and cooking time are not necessarily ideal.

To address this issue, controlled cooking is a key element of the OptiGrill™ concept. Control over the end result relies on two fundamental parameters: power and cooking time, which must be perfectly tailored to the product and the expected result.

OptiGrill™ technology is based on three key focuses:

- **6 specific cooking programmes** developed by the Tefal® Research and Development Department to automatically regulate the cooking time throughout the type of food, ensuring it is perfectly suited to the type and sensitivity of each ingredient and cooks it just as desired.

- **A « manual » mode** to give the user complete freedom to cook a wide range of foods (couscous, lemon, sauerkraut or even potatoes!) and give free reign to their imagination and ideas when preparing delicious side dishes.

- **Automatic detection** of the thickness of items to cook: «Automatic Sensor Cooking» technology measures the thickness and number of items of food in order to automatically adjust the temperature and cooking time to ensure a reliable level of cooking, whatever the thickness of the items to cook.

- **An indicator light** allowing the user to directly monitor cooking progress and end it at precisely the right time: rare (yellow), medium (orange) or well-done (red).

Cooking reliability with OptiGrill™ has been proven by colorimetric tests carried out in the laboratory on pieces of meat and fish, incorporating a wide range of variables. These tests show that cooking meat and fish with OptiGrill™ can be repeated with complete confidence. Results are completely reliable, however you like your meat cooked!

Source: Colorimetric tests on grilled food. Analysis report no. 12-SVA-1_m1, Laboratoire Aromalyse, France (Dijon), July-August 2012 (detailed procedure – page 19).

**THE GUARANTY OF SUCCULENT, TENDER AND SEARED MEAT**

The pleasure of eating meat obviously depends on the initial quality of the product but also, and most importantly, how it is cooked! Perfectly cooked meat is meat with attractive searing, colours and aromas on the surface and which remains tender and succulent for a melt-in-the-mouth experience. When meat-lovers are questioned about criteria decisive to their tasting pleasure, the primary factor mentioned is tenderness.

Source: Reference study on beef consumer satisfaction (Beef Information Centre, Canada, 2006)

Inappropriate cooking will have an impact on the tenderness of the meat. Insufficient or excessive cooking will inevitably lead to stiffening of the fibres and a loss of tenderness, which considerably detracts from consumer satisfaction.

Succulence is also a decisive factor in the pleasure procured by eating meat. The art of cooking meat lies in introducing it at a sufficiently high temperature at the start of cooking in order to create a crust on the surface. This crust, which should be just golden but, crucially, not burnt will hold the juices inside the meat during the second stage of core cooking at a lower temperature, thereby preserving its succulence.

That is why OptiGrill™ technology has been carefully studied to ensure perfectly controlled core cooking and maximum eating pleasure. The organoleptic qualities of red meat cooked with the OptiGrill™ have been assessed by a panel of 103 consumers. The tests were conducted on two different cuts – filet and rump steak of beef – and examined several criteria. The results indicate a high degree of satisfaction among regular eaters of medium-cooked red meat.

- **Core colour:** the majority of consumers were satisfied with the internal colour of the meat when «medium» cooked.

- **Correctly cooked:** 74% of consumers responded «quite agree» or «completely agree» to the fact that the beef filet was «perfectly medium-cooked».

- **Succulence:** concerning the filet, 89% of consumers agreed with the fact that «this steak is succulent».

- **Tenderness:** 88% of consumers enjoyed the tenderness of the filet when cutting into it and 86% of consumers enjoyed it when eating it.

- **External appearance:** 77% of consumers said they like the appearance of the grilled meat.


Some aspects of cooking are very difficult to control in a frying pan or on a traditional barbecue, including the surface temperature, as well as the core temperature which determines the cooking stage, i.e. rare, medium or well-done. Depending on the type of meat and the thickness of the cut, it is always difficult to perfect the optimum power and cooking time to best preserve the meat’s tenderness and succulence.

**TENDERNESS** depends on the cut considered and its protein content, but is also strongly influenced by the cooking method.

**SUCCULENCE** depends on the meat’s capacity to conserve its fluids during cooking and then release them when first chewed, which is why careful cooking is required.
CONTROLLING THE COOKING TEMPERATURE TO LIMIT THE DEVELOPMENT OF TOXINS ON THE SURFACE

Humans are exposed to polycyclic aromatic hydrocarbons (PAHs) through various channels, but for non-smokers food is the main source of exposure. These are chemicals formed during the incomplete combustion of organic matter. Food can be contaminated by environmental deposits or by transport, heating or fires. The major source of food contamination by PAHs, however, is thermal processing of food (industrial smoking or drying processes or domestic cooking such as barbecues).

Tefal® has developed an exclusive grilling technology for OptiGrill™ which limits the formation of toxins on the surface by taking into account all factors which promote production of these undesirable chemicals.

- **Regulation of the surface cooking temperature:** throughout the whole duration of the cooking time, the surface temperature is controlled and regulated to brown and sear the surface of the meat, then cook it gently.

- **Control of the cooking time:** the various programmes offered by OptiGrill™ make it possible to specifically adapt the cooking time to the composition and sensitivity of each type of food: poultry, red meat, fish, sausages, etc. OptiGrill™ also measures the thickness of items to be cooked and senses the «load» of the appliance, i.e. the number of items to grill. These parameters also allow the cooking time to be adjusted to achieve optimum core cooking. When the «well done» stage is reached, cooking automatically stops and the appliance switches to «keep warm» mode to reduce the risk of burning in the event of user oversight.

- **Contact cooking** (with complete isolation of the heat source): the elements are physically separated from the food by solid, grooved cooking surface which channels the cooking juices into a special tray. This means that the cooking juices never come into contact with the heat source and the fat content does not undergo pyrolysis, significantly reducing the smoking seen.

The effectiveness of these measures is proven by the amounts of PAHs and benzo(a)pyrenes observed depending on the type of product. Results have shown that cooking sausages, rib steaks and salmon steaks on OptiGrill™ produces up to 10 times less benzo(a)pyrene and PAH 4 than the maximum content permitted under European regulations* in smoked or thermally processed meat and meat-based products and muscle meat of smoked fish.

> average of 0.3 to 0.9µg/kg of PAH 4, or just 2.5% to 7.5% of the maximum content permitted under European regulations* in smoked or thermally processed meat and meat-based products and muscle meat of smoked fish.

> average of 0.1 to 0.3µg/kg of benzo(a)pyrene, or just 5% to 15% of the maximum content permitted under European regulations* in smoked or thermally processed meat and meat-based products and muscle meat of smoked fish.

The results of toxicology analyses are clear: OptiGrill™ technology considerably reduces the formation of PAHs during cooking of meat and fish.

Because enjoying good meat relies on proper preparation, OptiGrill™ allows perfect adjustment of all cooking parameters, for healthy and delicious eating, in line with your tastes, choices and needs!
## Controlled and reliable cooking

**Colorimetric tests on grilled food.** Analysis report no. 12-SVA-1-m1, Table de composition nutritionnelle des aliments CIQUAL 2012, FranceAgriMer 2011: la consommation mondiale de bœuf, Beef Information Center, Canada, 2006.

### Meat procedure

**Filet of beef**
- **Cooking level:** Yellow - Râne (Grill No.27), meat programme
  - Turn on appliance
  - Select the Meat programme, then press OK to begin pre-heating
  - Wait for the grill to sound to indicate that it is hot (fixed purple LED)
  - Open the grill and place the filet on the lower plate
  - Close the grill to begin cooking
  - Remove the filet on the third beep (yellow LED for rare), the fourth beep (orange LED for medium), the fifth beep (red Flashing LED indicating end of cooking)
- Cut the filet in two lengthways
- Carry out 10 internal colour measurements using the colorimeter (at different places in the cut)
- Carry out five repetitions on the 2cm steaks and five repetitions on the 3cm steaks
- Clean the plates between each cooking and wait for the grill to heat up each time before beginning cooking.

**Fish procedure**

**Salmon steaks:**
- Yellow cooking level (Grill No.14), fish programme
  - Turn on appliance
  - Select the Fish programme, then press OK to begin pre-heating
  - Wait for the grill to sound to indicate that it is hot (fixed purple LED)
  - Open the grill and place the salmon steak on the lower plate
  - Close the grill to begin cooking
  - Remove the fish piece(s) on the third beep (yellow LED), the fourth beep (orange LED), the fifth beep (red Flashing LED indicating end of cooking).

### Grilling steaks using a specialist electric grill, Report no. SD1656, Sen-son's (Rose Kiln Lane, Reading)

**Filet of beef**
- The steaks were in portions of approximately 120g and 2cm thick.
- The beef filet and rump steak came from the same farmer. All the steaks were 24 months old at the time of slaughter.
- The animals were fed on grass in summer and silage in winter. They were 24 months old at the time of slaughter.
- The meat was taken from a meat section of a local supermarket: Morn-son’s (Rose Kiln Lane, Reading)

**Rib steaks**
- The steaks were $10.30/kg at the time of purchase.
- The steaks were cut from the 12th to the 22nd rib.
- The steaks were vacuum packed and placed in the refrigerator.
- Five steaks were cooked on each occasion.

### Controlling the cooking temperature to limit the deve-lopment of toxins on the surface

**Level of Polycyclic Aromatic Hydrocarbons.** Analysis certificate no. 1201045 to 1201010, October 2012, Laboratoires Experagro, Saint Cloud, France.

**Cooking method:**
- Grill three TEFAL 2300/2000W grills, Lab no. 27, 19, 32
- Somagic Barb’ecou 1000 coal barbecue made from iron, purchased from a mass retailer, No.1, 2 and 3 for the study.
- Vacuum sealer apparatus (see report for references).

**Products to analyse:**
- Beef rib steaks (2cm thick)
- Pork sausages
- Salmon steaks (between 5cm and 6cm thick)

**Preparation of samples:**
- Preparation of rib steaks: Take six rib steaks for the different cooking times.
- Preparation of sausages: Take six batches of six sausages for the different cooking times.
- Preparation of the salmon: Take six batches of two salmon steaks for the different cooking times.

**Cooking times on the grill**

**Rib steaks** on the Meat programme. **Salmon on the Fish programme**

Sausages
- Average cooking time on the grill: 13 mins 46 sec
  - Once barbecue no. 1 is hot, place the rib steak on the grill and start the stopwatch
  - Turn the steaks half way through cooking (3 mins 36 sec)
  - Remove the rib steak at the end of the determined average cooking time.

**Sausages**
- Average cooking time on the grill: 13 mins 46 sec
  - Once barbecue no. 2 is hot, place the six sausages on the grill and start the stopwatch
  - Turn the sausages regularly
  - Remove the sausages at the end of the determined average cooking time.

**Salmon steaks**
- Average cooking time on the grill: 14 mins 14 sec
  - Once the barbecue is hot, place the two steaks skin side down on the grill and start the stopwatch
  - Turn the steaks half way through cooking (7 mins 07 sec)
  - Remove the steaks at the end of the determined average cooking time
  - Test the samples for PAH levels: minimum 100g. Vacuum seal and then place in an identified hermetically sealed jar to send to the Technological Micropol-lutants laboratory.

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