

OptiGrill™



THE PLEASURE OF PERFECT GRILLING RESULTS



Meat and fish are the ultimate quality, staple foods and occupy a preminent 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.

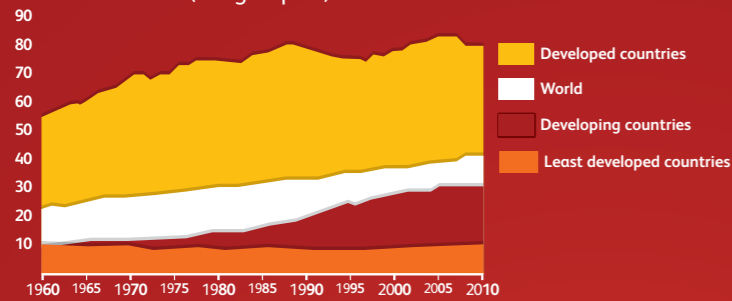
OptiGrill™ is the ideal grilling tool: a grill which guarantees successful cooking exactly as you like it from a well-known brand name in grills.

Tefal
OptiGrill®



MEAT

Change in global meat consumption (in kg/capita)



286 200 000
tonnes of meat products
consumed globally in 2010

Source : France AgriMer according to FAO, 2010 estimate

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.

Breakdown in consumption of meat products around the world



Source : FranceAgriMer according to FAO (2010 estimate)

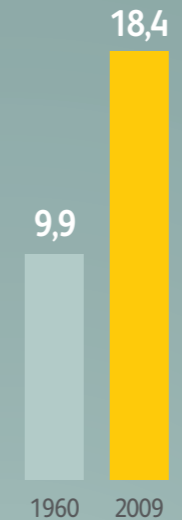


Meat is an important part of a balanced diet, representing a good source of animal proteins, vitamin B12 and iron in particular.



FISH

Changes in consumption* (in kg/capita/year)



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.

128 300 000
tonnes of fish
consumed globally in 2010*

*Source : FAO, The State of World Fisheries and Aquaculture, 2012 – 2010 data

Fisheries and aquaculture around the world: production in 2010* (in millions of tonnes)

Inland capture	11,2
Marine capture	77,4
Total capture	88,6
Inland aquaculture	41,7
Marine aquaculture	18,1
Total aquaculture	59,9

TOTAL WORLD FISHERIES 148,5

Annual per capita consumption of fishery products (per capita)



Source FAO, La situation mondiale des pêches et de l'aquaculture, 2012



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



MEAT & FISH A DAILY REFLEX!

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

Nutritional benefits

Source : Ciqual 2012 - ANSES

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



Recommendations for protein*-based food consumption by country :

CANADA
Canada's Food Guide

■ 1 portion: 75g of meat, fish, poultry or two eggs, ¼ cup of raw, dry vegetables

UNITED KINGDOM
The eatwell plate

FOOD STANDARDS AGENCY

FRANCE
PNNS : National nutrition and health programme

- Meat and poultry, fish and eggs: 1 - 2 times / day
- Fish: at least twice a week

UNITED STATES
chooseMyPlate

■ 1 portion (2 oz): i.e. 57g of meat, fish, poultry or two eggs, ¼ cup of dry vegetables

AUSTRALIA
eatforhealth

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

* 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, soya-based products and nuts.

OPTIGRILL™ THE CHOICE IS CLEAR!

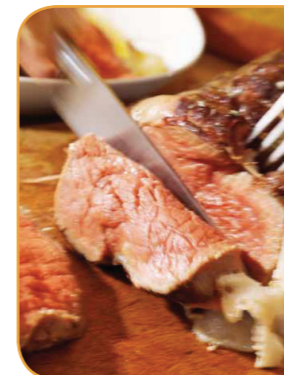


The choice is clear! When you decide to treat yourself to a high-quality product, you naturally want to preserve all of its properties as much as possible so that you can maintain your health while eating a delicious meal!

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!



COOKED TO PERFECTION

A CHOICE OF 6 PROGRAMMES

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.



SUCCULENT TENDER MEAT PROPERLY SEARED

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.



CONTROLLED COOKING

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

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.



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.

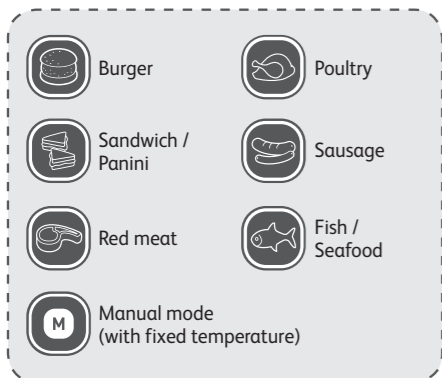
To address this issue, controlled cooking is a key element of the OptiGrill™ concept. Control over the end result relies on two fundamental parameters: power and cooking time, which must be perfectly tailored to the product and the expected result.

OptiGrill™ technology is based on three key focuses:

- **6 specific cooking programmes** developed by the Tefal® Research and Development Department to automatically regulate the temperature throughout the cooking time, to ensure it is perfectly suited to the type and sensitivity of each ingredient and cooks it just as desired.
 - A «**frozen foods**» option, which adapts cooking parameters if products are not defrosted before cooking.
 - A «**manuel**» mode to give the user complete freedom to cook a wide range of foods (courgette slices, tomato, aubergine 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 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 10)



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 Center, 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.

Source : Issanchou S.: Consumer expectations and perceptions of meat and meat product quality, INRA Dijon, Meat Science, Vol. 43(5) 1996

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.

Source : Grilling steaks using a specialist electric grill, Report no. D1656, Sensory Dimensions, UK, September 2012 (detailed procedure at the end of the document)



TENDERNESS depends on the cut considered and its protein context, 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.

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.

➔ With its exclusive programmes, measurement of thickness and load sensor, OptiGrill™ is the clear choice for optimised cooking of meat and fish. And the cooking progress indicator – which tells the user the ideal moment to remove the food depending on the desired result – means that OptiGrill™ offers perfectly controlled and reliable cooking, producing perfect results and ensuring complete satisfaction!

➔ With its innovative and exclusive technology, OptiGrill™ is able to perfectly adjust all cooking parameters to best promote the full taste of the meat. The external appearance perfectly matches the expectations of most lovers of grilled meat, core cooking is completely controlled to ensure that eating it is a pure moment of pleasure!



CONTROLLING THE COOKING TEMPERATURE

TO LIMIT THE DEVELOPMENT OF TOXINS ON THE SURFACE

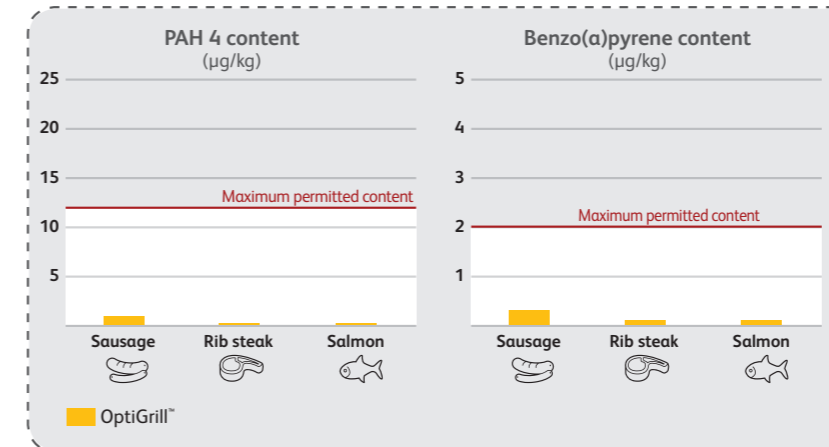
Humans are exposed to polycyclic aromatic hydrocarbons (PAHs) through various channels, but for non-smokers food is the main source of exposure. These are chemicals formed during the incomplete combustion of organic matter. Food can be contaminated by environmental deposits or by transport, heating or 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).

Source : Evaluation of risks presented by benzo(a)pyrene (B(a)P) and other polycyclic aromatic hydrocarbons (PAHs), AFSSA, court report no. 2000-SA-0005, July 2003

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.

PAH (polycyclic aromatic hydrocarbons) : Generic name for a family of benzene derivatives which are atmospheric pollutants and can be found in cooked food** Benzo(a)anthracene, chrysene, benzo(b)fluoranthene and benzo(a)pyrene are taken into account for the calculation of PAH4.

Benzo(a)pyrene : Polycyclic aromatic hydrocarbon, with known carcinogenic properties, often used as an indicator of food's contamination by hydrocarbons.

**Source: Manfred and Nicole Moll, Précis Des Risques Alimentaires, 2000

Source : «Level of Polycyclic Aromatic Hydrocarbons, Analysis certificate no. 1210405 to 1210410, October 2012, Laboratoire EXPERAGRO, Saint Cloud, France.»

*Commission regulation (EU) No 835/2011 of 19 August 2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuffs. New data applicable from 1.9.2014. No data available for grilled meats and 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!

DETAILED PROCEDURES

Controlled and reliable cooking

Colorimetric tests on grilled food, Analysis report no. 12-SVA-1_m1, Laboratoire Aromalyse, France (Dijon), July-August 2012

• Meat procedure

Filet of beef : Cooking level Yellow = Rare (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 colorimetre (at different places in the cut)
- Carry out five repetitions on the 2cm steaks and five repetitions on the 3cm steaks
- Clean the plate 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).

The guaranty of juice, tender and seared meat

Grilling steaks using a specialist electric grill, Report no. SD1656, Sensory Dimensions, UK, September 2012.

- 103 consumers took part in a 30 minute sensory analysis on two pieces of filet and rump steak. Each tester ate an entire steak cooked on the electric grill.
- Testers scored each sample presented with a three-digit code.
- Products were presented in sequence, with a five to 10 minute break between each one. During the breaks, testers cleaned their palate with a savory biscuit and mineral water.
- A maximum of 20 consumers were present at each session. Each respondent answered 10 closed questions. These included a nine-point hedonic scale on the general opinion and sensory characteristics, a five-point JAR scale to assess how the meat was cooked and a five-point hedonic scale on agreement or disagreement with five statements, and intention to buy the appliance.
- The data was collected using Compusense 5.0 data collection software.
- The data on the nine-point hedonic scale was analysed using variance analysis (ANOVA) and Tukey HSD test to identify significant differences in terms of confidence at the 95% level.
- Data averages and significant differences were presented in tables. Frequency, sensory characteristics and status questions were presented in the form of a column chart.
- The meat come from a meat section of a local supermarket: Morrison's (Rose Kiln Lane, Reading)
- The animals were fed on grass in summer and silage in winter. They were 24 months old at the time of slaughter.
- The beef filet and rump steak came from the same farmer. All the meat was hung for 21 days before being butchered.
- The steaks were in portions of approximately 120g and 2cm thick.

Controlling the cooking temperature to limit the development of toxins on the surface

Level of Polycyclic Aromatic Hydrocarbons, Analysis certificate no. 1210405 to 1210410, October 2012, Laboratoire Experagro, Saint Cloud, France.

• Cooking method:

- Grills: three TEFAL 230V/2000W grills, Lab no. 27, 19, 32
- Somagic Barb'eco 1000 coal barbecue made from iron, purchased from a mass retailer. No. 1, 2 and 3 for the study.
- Vacuum sealer appliance (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** on the Sausages programme.

Cooking is carried out based on the appliance's instruction for use:

- Turn on appliance
 - Select the appropriate 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 rib steak, salmon or sausage on the lower plate
 - Close the grill to begin cooking
 - Start the stopwatch
 - Remove the rib steak, salmon or sausage on the fifth beep (red flashing LED indicating end of cooking), and note the 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 Micropollutants laboratory
 - Store the jars in the refrigerator until they are sent
- Repeat three times. Change the plates each time before beginning cooking.

> Cooking on the barbecue

- **Rib steaks**: Average cooking time on the grill: 7 mins 12 sec
- Once barbecue no. 1 is hot, place the rib steak on the grill and start the stopwatch
- Turn the steak half way through cooking (3 mins 36 sec)
- Remove the rib steak 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 Micropollutants laboratory
- Store the jars in the refrigerator until they are sent

Repeat three times. Once the barbecue is hot, wait 10 mins each time before cooking. Add wood, paper or coal if there are insufficient hot embers. Wash the grill each time before beginning cooking.

- **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.
- Test the samples for PAH levels: minimum 100g. Vacuum seal and then place in an identified hermetically sealed jar to send to the Technological Micropollutants laboratory
- Store the jars in the refrigerator until they are sent

Repeat three times. Once the barbecue is hot, wait 10 mins each time before cooking. Add wood, paper or coal if there are insufficient hot embers. Change the grill each time before beginning cooking.

- **Salmon steaks**: Average cooking time on the grill: 14 mins 14 sec
- Once the barbecue 3 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 Micropollutants laboratory
- Store the jars in the refrigerator until they are sent

Repeat three times. Once the barbecue is hot, wait 10 mins each time before cooking. Add wood, paper or coal if there are insufficient hot embers. Change the grill each time before beginning cooking.

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