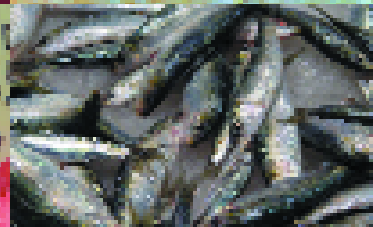
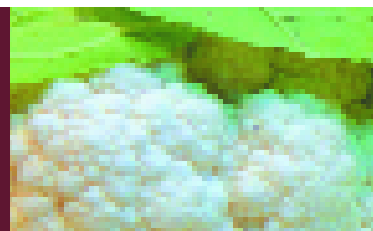
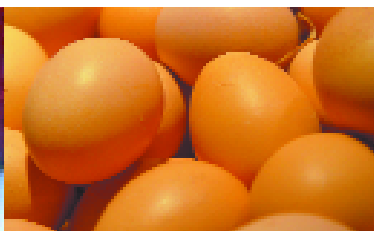


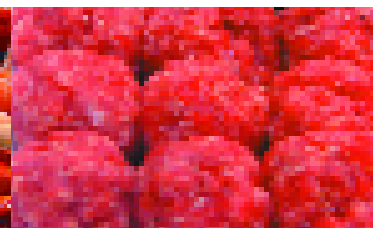
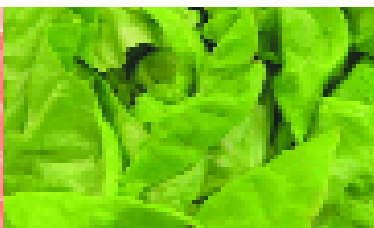
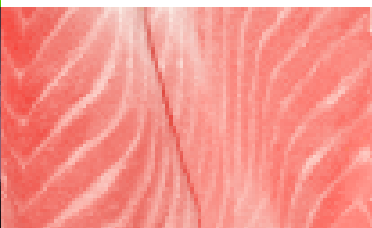
## FOOD CONTENT OF POTENTIAL CARCINOGENS

Nitrates, nitrites, nitrosamines, heterocyclic amines and polycyclic aromatic hydrocarbons



## CONTENIDO DE SUSTANCIAS POTENCIALMENTE CANCERÍGENAS EN ALIMENTOS

Nitratos, nitritos, nitrosaminas, aminos heterocíclicos e hidrocarburos aromáticos policíclicos



# **HETEROCYCLIC AMINES / AMINAS HETEROCÍCLICAS**



## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food          | Alimento    | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author   | Country Code | Source | Ref. |
|---------------|-------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|--|--------------|--------|------|
|               |             | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor  | Código País  | Fuente |      |
| Bacon         | Bacon       | FR             | na                 | 170     | 12-16        | nd-53       | 0.9-27       | nd-2.4         |           |           |             | n.a   | NA               | 4               | 1993 | Gross et al. <sup>18</sup>                                 | CH           | C      | 7    |
| Bacon         | Bacon       | FR             | na                 | 150     |              | 0.2-1       | 2.5-2.8      | 1-3.4          |           | 38-10.5   | nd-1.70     | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup>                      | SE           | C      | 7    |
| Bacon         | Bacon       | MW             | na                 |         |              | 0.00        | 0.10         | 0.00           | 0.10      |           |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | FR             | na                 | 225     |              | 1.6-2.7     | 0.9-1.2      | 0.2-0.3        |           |           |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 7    |
| Bacon         | Bacon       | FR             | na                 | 150-225 | 2-4          | 0.3-4.5     | nd-23.70     | 0.2-1.4        |           | nd        | nd          | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>                                  | SE           | C      | 7    |
| Bacon         | Bacon       | FR             | na                 |         |              | 18.6        | 27.8         | 2.82           | 0.00      |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup><br>Thiebaud et al. <sup>25</sup> | SE/US        | C      | 9    |
| Bacon         | Bacon       | FR             | na                 | 208     | 6            | 106         | 45           | 12             |           | nd        |             | n.a   | NA               | 4               | 1995 | Thiebaud et al. <sup>25</sup>                              | US           | C      | 7    |
| Bacon         | Bacon       | MW             | vwd                |         |              | 3.1         | 1.50         | 0.20           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | FR             | vwd                |         |              | 4.8         | 4.30         | 0.50           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | BR             | vwd                |         |              | 46.2        | 0.60         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | MW             | wd                 |         |              | 0.00        | 0.40         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | FR             | wd                 |         |              | 0.71        | 1.70         | 0.00           |           | 1.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | BR             | wd                 |         |              | 5.71        | 1.6          | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>                                 | US           | C      | 9    |
| Bacon         | Bacon       | FR             | me                 | 200     |              | 0.11        | 0.22         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>                               | NZ           | D      | 32   |
| Bacon         | Bacon       | FR             | me                 | 176     | 4            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>                                 | US           | D      | 31   |
| Bacon         | Bacon       | FR             | vwd                | 176     | 16.1         | 0.60        | 2.30         |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>                                 | US           | D      | 31   |
| Bacon         | Bacon       | FR             | wd                 | 200     |              | 1.93        | 3.79         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>                               | NZ           | D      | 32   |
| Bacon         | Bacon       | FR             | wd                 | 177     | 8.8          | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>                                 | US           | D      | 31   |
| Bacon (fatty) | Bacon graso | FR             | na                 |         |              | 2.7         | 1.2          | 0.3            | 0.10      |           |             | n.a   | NA               | 4               | 1993 | Gross et al. <sup>18</sup>                                 | CH           | C      | 9    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                 | Alimento                    | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                                | Country Code | Source | Ref. |
|----------------------|-----------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------------|--------------|--------|------|
|                      |                             | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                                 | Código País  | Fuente |      |
| Bacon (fatty)        | Bacon graso                 | FR             | na                 |         |              | 2.70        | 1.20         | 0.30           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>           | UK           | D      | 28   |
| Bacon (fatty)        | Bacon graso                 | FR             | vwd                |         |              | 2.28        | 0.57         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>            | US           | C      | 9    |
| Bacon (fatty)        | Bacon graso                 | FR             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>            | US           | C      | 9    |
| Bacon (lean)         | Bacon magro                 | FR             | na                 |         |              | 1.60        | 0.90         | 0.20           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>           | UK           | D      | 28   |
| Bacon (pan residues) | Bacon (restos en la sartén) | FR             | na                 | 150     |              | nd          | 2-5.9        | 0.2-1.7        |           | nd        | nd          | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Bacon (pan residues) | Bacon (restos en la sartén) | FR             | na                 | 150-225 | 3            | 0.06-0.80   | nd-0.90      | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1995 | Sujimura et al. <sup>14</sup>         | SE           | C      | 7    |
| Beef                 | Carne de vaca/buey          | NA             | me                 |         |              | 0.53        | 0.138        | nd             |           | nd        | 0.125       | n.a   | GC               | 1               | 2002 | Kataoka et al. <sup>58</sup>          | JP           | D      | 58   |
| Beef                 | Carne de vaca/buey          | GR             | na                 |         |              | 14.0        | 6.00         | 1.20           |           |           |             | n.a   | NA               | 4               | 1997 | Fay et al. <sup>38</sup>              | CH           | C      | 7    |
| Beef                 | Carne de vaca/buey          | FR             | na                 |         |              |             | 8.15         | 3.9            |           | 190       |             | n.a   | NA               | 4               | 1991 | Felton et al. <sup>13</sup>           | US           | C      | 9    |
| Beef                 | Carne de vaca/buey          | FR             | na                 |         | 14           |             | 8.70         | 4.10           |           | 2.00      |             | mn    | CZE              | 3               | 1998 | Mardones et al. <sup>27</sup>         | ES           | D      | 27   |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food           | Alimento                     | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                               | Country Code | Source | Ref. |
|----------------|------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|--------------------------------------|--------------|--------|------|
|                |                              | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                                | Código País  | Fuente |      |
| Beef           | Carne de vaca/buey           | BA             | na                 | 200-500 | 15           |             | 4.00         |                |           |           | 8           | n.a   | NA               | 4               | 1996 | Rivera et al. <sup>41</sup>          | ES           | C      | 7    |
| Beef           | Carne de vaca/buey           | NE             | na                 |         |              | 0.00-20.0   | 0.00-8.00    |                | 0.00-20.0 |           |             | p     | NA               | 4               | 2002 | Skog et al. <sup>2</sup>             | SE           | C      | 2    |
| Beef           | Carne de vaca/buey           | GR             | na                 |         |              | 27.0        | 2.11         |                |           | 0.19      |             | n.a   | NA               | 4               | 1993 | Wakabayashi et al. <sup>45</sup>     | JP           | C      | 7    |
| Beef           | Carne de vaca/buey           | NA             | wd                 |         |              | 0.63        | 0.198        | nd             |           | nd        | 0.94        | n.a   | GC               | 1               | 2002 | Kataoka et al. <sup>58</sup>         | JP           | D      | 58   |
| Beef           | Carne de vaca/buey           | BK             | me                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef           | Carne de vaca/buey           | BK             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | BR             | me                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | BA             | me                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | FR             | me                 |         |              | 0.00        | 1.00         | 0.14           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | FR             | na                 |         |              |             | 0.64         | 0.12           |           |           |             | n.a   | NA               | 4               | 1993 | Wakabayashi et al. <sup>45</sup>     | JP           | C      | 7    |
| Beef (minced)  | Carne de vaca/buey picada    | BR             | vwd                |         |              | 0.00        | 1.61         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | FR             | vwd                |         |              | 2.32        | 4.25         |                |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | BA             | vwd                |         |              | 8.39        | 1.39         | 0.15           | 0.00      | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | BR             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | FR             | wd                 |         |              | 0.00        | 2.35         | 0.00           |           | 29.0      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (minced)  | Carne de vaca/buey picada    | BA             | wd                 |         |              | 6.00        | 2.23         | 4.33           | 4.15      | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>           | US           | C      | 9    |
| Beef (extract) | Concentrado de carne de vaca | NA             | na                 |         |              |             | 5.07         | nd             |           | nd        | 5.77        | n.a   | NA               | 4               | 1996 | Galceran et al. <sup>43</sup>        | ES           | C      | 7    |
| Beef (extract) | Concentrado de carne de vaca | NA             | na                 |         |              |             |              |                |           | 15.0      |             | n.a   | NA               | 4               | 1996 | Ghoshal and Snyderwine <sup>44</sup> | ES           | C      | 7    |
| Beef (extract) | Concentrado de carne de vaca | NA             | na                 |         |              | 0.20        | 30.0         | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1996 | Holder et al. <sup>39</sup>          | SE           | C      | 7    |

MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                       | Alimento  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                           | Country Code | Source | Ref. |
|----------------------------|---|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|----------------------------------|--------------|--------|------|
|                            |   | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                            | Código Pais  | Fuente |      |
| Beef (extract)             | Concentrado de carne de vaca                    | NA             | na                 |         |              | < 0.10      | 0.60         | < 0.10         |           |           |             | n.a   | NA               | 4               | 1993 | Murray et al. <sup>28</sup>      | UK           | C      | 7    |
| Beef (extract)             | Concentrado de carne de vaca                    | NA             | na                 |         |              | nd-10.0     | nd           | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Pais et al. <sup>47, 48</sup>    | ES           | C      | 7    |
| Beef (extract)             | Concentrado de carne de vaca                    | NA             | na                 |         |              |             | 9.30         |                |           |           | 10.4        | n.a   | NA               | 4               | 1997 | Puignou et al. <sup>46</sup>     | ES           | C      | 7    |
| Beef (extract)             | Concentrado de carne de vaca                    | NA             | na                 |         |              |             | 3.10         |                |           |           |             | n.a   | NA               | 4               | 1993 | Wakabayashi et al. <sup>45</sup> | JP           | C      | 7    |
| Beef (minced pan residues) | Carne de vaca/buey picada (restos en la sartén) | FR             | na                 |         |              | 2.50        | 1.75         | 0.85           |           |           |             | n.a   | NA               | 4               | 1995 | Johansson et al. <sup>24</sup>   | SE           | C      | 9    |
| Beef (minced)              | Carne de vaca/buey picada                       | FR             | na                 | 200-250 | 6            | 0.70-13.3   | nd-5.10      | 0.10-1.20      |           | nd-1.00   |             | n.a   | NA               | 4               | 1994 | Felton et al. <sup>19</sup>      | US           | C      | 7    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                       | Alimento                                  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year      | Author                                | Country Code | Source | Ref. |
|----------------------------|---|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|-----------|---------------------------------------|--------------|--------|------|
|                            |   | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año       | Autor                                 | Código País  | Fuente |      |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 |         |              | 0.30        | nd           | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1996      | Holder et al. <sup>39</sup>           | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 180-190 | 6            | 1.20        | 0.03-2.80    | nd-0.70        |           | nd-0.10   | nd          | n.a   | NA               | 4               | 1994      | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 165-200 |              | 0.80-1.50   | 0.20-1.60    | nd-0.40        |           |           |             | n.a   | NA               | 4               | 1995      | Johansson et al. <sup>54</sup>        | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 |         |              | nd          | 0.40         | 0.10           |           |           | 0.04        | n.a   | NA               | 4               | 1994      | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | BA             | na                 |         | 10           | nd          | 0.1          | 0.20           |           | nd        | nd          | n.a   | NA               | 4               | 1994      | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | BA             | na                 |         |              | 38.0        | 4.40         | 2.70           |           | 1.60      |             | n.a   | NA               | 4               | 1995      | Knize et al. <sup>8</sup>             | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 |         |              | 11.0-290    | nd-0.89      | nd-0.30        |           |           |             | n.a   | NA               | 4               | 1996/1997 | Knize et al. <sup>42, 53</sup>        | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 |         |              | 0.10-0.60   | < 0.10-0.30  | < 0.10-0.10    |           |           |             | n.a   | NA               | 4               | 1995      | Knize et al. <sup>8</sup>             | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 230     | 12           | 4.10        | 1.10         | 0.25           |           | 0.25      |             | n.a   | NA               | 4               | 1995      | Knize et al. <sup>8</sup>             | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 |         |              | nd          | 0.26-0.68    | 0.10-0.28      |           |           |             | n.a   | NA               | 4               | 1998      | Knize et al. <sup>8</sup>             | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 150-230 | 6            | nd-32.0     | nd-7.30      | nd-1.60        |           | nd-0.70   |             | n.a   | NA               | 4               | 1994      | Knize et al. <sup>52</sup>            | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 150-225 | 3.5          | 4.00        | 3.50         | 0.30           |           |           |             | n.a   | NA               | 4               | 1997      | Reistad et al. <sup>49</sup>          | NO           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 | 180-200 | 12           | 50.0        | 2.20         | nd             |           |           |             | n.a   | NA               | 4               | 1997      | Reistad et al. <sup>49</sup>          | NO           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | GR             | na                 | 100-90  | 20           | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 1994      | Sinha et al. <sup>51</sup>            | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 250     | 11           | 32.8        | 9.00         | 2.10           |           |           |             | n.a   | NA               | 4               | 1994      | Sinha et al. <sup>51</sup>            | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 150-225 | 6            | 0.01-1.10   | nd-2.20      | nd-0.80        |           | nd        | nd          | n.a   | NA               | 4               | 1995      | Skog et al. <sup>21</sup>             | SE           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 198-277 | 6            | 4.90-68     | 4.30         | 1.30           |           |           |             | n.a   | NA               | 4               | 1995      | Thiebaud et al. <sup>25</sup>         | US           | C      | 7    |
| Beef (minced)              | Carne de vaca/buey picada                 | FR             | na                 | 277     | 7            | 67.5        | 16.40        | 4.50           |           |           |             | n.a   | NA               | 4               | 1994      | Thiebaud et al. <sup>50</sup>         | US           | C      | 7    |
| Beef (minced, pan residue) | Carne de vaca/buey picada (restos sartén) | FR             | na                 | 180-190 | 6            | nd          | 0.6-5.3      |                |           | nd-1.50   | 1.70        | n.a   | NA               | 4               | 1994      | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |

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| Food                              | Alimento  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                         | Country Code | Source | Ref. |
|-----------------------------------|---|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|--------------------------------|--------------|--------|------|
|                                   |   | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                          | Código País  | Fuente |      |
| Beef (minced, pan residue)        | Carne de vaca/buey picada (restos en la sartén) | FR             | na                 | 150-225 | 6            | 0.08-11.2   | 0.06-5.80    | 0.02-1.10      |           | nd        | nd          | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>      | SE           | C      | 7    |
| Beef (minced, pan residue)        | Carne de vaca/buey picada (restos en la sartén) | FR             | na                 | 165-200 |              | 0.40-13.3   | 0.80-4.30    | 0.40-1.30      |           | nd        | nd          | n.a   | NA               | 4               | 1995 | Johansson et al. <sup>55</sup> | SE           | C      | 7    |
| Beef (minute steak)               | Filete de carne de vaca/buey                    | FR             | na                 | 150-225 | 3.5          | 0.02-12.7   | nd-6.20      | nd-2.70        |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>      | SE           | C      | 7    |
| Beef (minute steak, pan residues) | Filete de carne vacuna (restos en la sartén)    | FR             | na                 | 150-225 | 3.5          | 0.20-82.4   | 0.10-23.3    | 0.10-4.10      |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>      | SE           | C      | 7    |
| Beef (minute steak, pan residues) | Filete de carne vacuna (restos en la sartén)    | FR             | na                 |         |              | 23.4        | 15.4         | 5.8            |           |           |             | n.a   | NA               | 4               | 1994 | Gross et al. <sup>18</sup>     | CH           | C      | 9    |
| Beef (steak)                      | Filete de vaca/buey                             | GD             | me                 |         |              | 10.0        | 1.70         | 0.10           |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>     | US           | D      | 16   |



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| Food         | Alimento            | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                        | Country Code | Source | Ref. |
|--------------|---------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-------------------------------|--------------|--------|------|
|              |                     | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                         | Código País  | Fuente |      |
| Beef (steak) | Filete de vaca/buey | BA             | me                 |         |              | 12.0        | 1.10         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Beef (steak) | Filete de vaca/buey | FR             | me                 |         |              | 0.00        | 1.94         | 0.12           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BR             | me                 |         |              | 2.08        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BA             | me                 |         |              | 4.71        | 0.64         | 0.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | FR             | me                 | 200     |              | 0.29        | 0.00         | 0.06           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>  | NZ           | D      | 32   |
| Beef (steak) | Filete de vaca/buey | FR             | na                 |         |              | 2.16        | 4.30         | 0.93           |           | 0.10      |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>     | SE           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BA             | vwd                |         |              | 5.70        | 1.20         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Beef (steak) | Filete de vaca/buey | GD             | vwd                |         |              | 9.00        | 2.40         | 0.40           |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Beef (steak) | Filete de vaca/buey | FR             | vwd                |         |              | 23.2        | 8.19         | 1.30           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BA             | vwd                |         |              | 33.3        | 5.78         | 1.90           | 0.00      | 0.00      | 0.00        | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BR             | vwd                |         |              | 7.08        | 1.51         | 0.19           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | FR             | vwd                | 200     |              | 7.33        | 3.80         | 0.80           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>  | NZ           | D      | 32   |
| Beef (steak) | Filete de vaca/buey | FR             | wd                 |         |              | 6.53        | 4.07         | 0.45           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | BA             | wd                 |         |              | 8.70        | 2.17         | 0.00           | 0.00      | 0.00      | 0.00        | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Beef (steak) | Filete de vaca/buey | FR             | wd                 | 200     |              | 0.73        | 0.25         | 0.07           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>  | NZ           | D      | 32   |
| Beef (steak) | Filete de vaca/buey | BA             | me                 |         |              | 12.0        | 1.10         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Beef (steak) | Filete de vaca/buey | FR             | na                 |         | 14           |             | 5.00         | 1.80           |           | 12.5      |             | mn    | CZE              | 2               | 1998 | Mardones et al. <sup>27</sup> | ES           | D      | 27   |
| Beef (steak) | Filete de vaca/buey | BA             | wd                 |         |              | 15.0        | 1.60         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Beef (steak) | Filete de vaca/buey | GD             | wd                 |         |              | 6.80        | 1.80         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |

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| Food              | Alimento                     | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author  | Country Code | Source | Ref. |
|-------------------|------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---|--------------|--------|------|
|                   |                              | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor   | Código Pais  | Fuente |      |
| Beef (stock-cube) | Carne de vaca/buey (cubitos) | NA             | na                 |         |              | 0.30        | 0.60         | 0.30           |           |           |             | mn    | GC-MS            | 3               | 1998 | Murray et al. <sup>28</sup>                                   | UK           | D      | 28   |
| Bologna           | Mortadela                    | FR             | me                 |         |              | 0.88        | nd           |                |           | 0.25      |             | mn    | HPLC-MS          | 3               | 2003 | Holder et al. <sup>30</sup>                                   | UK           | D      | 30   |
| Breast            | Pechuga de pollo             | BR             | na                 | 200     | 38           | 0.1         | nd           | nd             |           | nd        |             | n.a   | NA               | 4               | 2003 | Solyakov and Skog <sup>60</sup>                               | SE           | C      | 59   |
| Breast            | Pechuga de pollo             | MW             | na                 | 160     |              | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 2003 | Solyakov and Skog <sup>60</sup>                               | SE           | C      | 59   |
| Chicken           | Pollo                        | NA             | na                 |         |              | 6.40        | 0.54         | nd             |           |           |             | n.a   | NA               | 4               | 1999 | Knize et al. <sup>42, 53</sup>                                | US           | C      | 7    |
| Chicken           | Pollo                        | GR             | na                 |         | 14-26        | 44.0-315    | 0.80-1.70    |                |           |           |             | n.a   | NA               | 4               | 1995 | Knize et al. <sup>53</sup>                                    | US           | C      | 7    |
| Chicken           | Pollo                        | GR             | na                 |         |              | 21.0-270    | nd-0.63      | 0.53-3.10      |           |           |             | n.a   | NA               | 4               | 1998 | Knize et al. <sup>53</sup>                                    | US           | C      | 7    |
| Chicken           | Pollo                        | BA             | na                 |         |              | 270         | nd           | 3.10           |           |           |             | n.a   | NA               | 4               | 1998 | Knize et al. <sup>42</sup>                                    | US           | C      | 7    |
| Chicken           | Pollo                        | BA             | na                 |         |              |             | 0.30         | 0.10           |           |           |             | n.a   | NA               | 4               | 2003 | Murray et al. <sup>28</sup>                                   | UK           | C      | 7    |
| Chicken           | Pollo                        | BR             | na                 |         |              | 38.1        | 2.33         | 0.81           | 0.21      |           |             | n.a   | NA               | 4               | 2003 | Sugimura et al. <sup>14</sup><br>Hayatsu et al. <sup>15</sup> | JP           | C      | 9    |
| Chicken           | Pollo                        | STW            | na                 |         |              | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 2003 | Sinha et al. <sup>51</sup>                                    | US           | C      | 7    |

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| Food                      | Alimento                  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                           | Country Code | Source | Ref. |
|---------------------------|---------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|----------------------------------|--------------|--------|------|
|                           |                           | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                            | Código País  | Fuente |      |
| Chicken                   | Pollo                     | BA             | na                 |         | 10-63        | 27.0-480    | nd-9.00      | nd-2.00        |           |           |             | n.a   | NA               | 4               | 1994 | Sinha et al. <sup>51</sup>       | US           | C      | 7    |
| Chicken                   | Pollo                     | FR             | na                 |         | 9-43         | 6.00-150    | nd-3.00      | nd             |           |           |             | n.a   | NA               | 4               | 1994 | Sinha et al. <sup>51</sup>       | US           | C      | 7    |
| Chicken                   | Pollo                     | ROA            | na                 | 150-200 | 30           | < 0.30      | nd           | nd             |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Chicken                   | Pollo                     | FR             | na                 | 175-225 | 15           | 0.50-10.0   | 0.40-0.50    | 0.20-0.50      |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Chicken                   | Pollo                     | ROA            | na                 | 175     |              | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Chicken                   | Pollo                     | NE             | na                 |         |              | 0.00-1.00   | 0.00-3.00    |                | 0.00-40.0 |           |             | p     | NA               | 4               | 2002 | Skog et al. <sup>2</sup>         | SE           | C      | 2    |
| Chicken                   | Pollo                     | GR             | na                 |         |              | 0.11        | 0.051        | 0.0195         |           |           |             | mn    | GC               | 2               | 1993 | Tikkanen et al. <sup>11</sup>    | FI           | D      | 11   |
| Chicken                   | Pollo                     | NA             | na                 |         |              | nd-0.01     | nd-0.10      | nd-0.08        |           |           |             | n.a   | NA               | 4               | 1993 | Tikkanen et al. <sup>11</sup>    | FI           | C      | 7    |
| Chicken                   | Pollo                     | GR             | na                 |         |              |             | 2.33         | 0.81           |           |           |             | n.a   | NA               | 4               | 1993 | Wakabayashi et al. <sup>45</sup> | JP           | C      | 7    |
| Chicken                   | Pollo                     | BO             | na                 | 100     | 23           | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 2002 | Solyakov and Skog <sup>60</sup>  | SE           | C      | 59   |
| Chicken                   | Pollo                     | ROA            | na                 | 20      |              | 3.85        | 2.70         | 1.65           |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>    | DE           | D      | 29   |
| Chicken                   | Pollo                     | BA             | na                 |         |              | nd          | 0.30         | 0.10           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>      | UK           | D      | 28   |
| Chicken (breast skin)     | Pechuga de pollo sin piel | BR             | wd                 |         |              | 131         | 0.00         | 0.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | BA             | me                 |         |              | 27.0        | 0.00         | 0.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | FR             | vwd                |         |              | 70.0        | 3.00         | 4.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | BR             | vwd                |         |              | 150         | 3.00         | 0.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | BA             | vwd                |         |              | 480         | 9.00         | 1.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | FR             | vwd                |         |              | 70.0        |              | 4.00           |           | 0.00      | 0.00        | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | BA             | wd                 |         |              | 140         | 2.00         | 1.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>       | US           | C      | 9    |

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| Food                      | Alimento                  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                     | Country Code | Source | Ref. |
|---------------------------|---------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|----------------------------|--------------|--------|------|
|                           |                           | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                      | Código País  | Fuente |      |
| Chicken (breast non skin) | Pechuga de pollo sin piel | FR             | wd                 |         |              | 37.0        | 2.00         | 2.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup> | US           | C      | 9    |
| Chicken (breast non skin) | Pechuga de pollo sin piel | BR             | wd                 |         |              | 64.0        | 0.00         | 0.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup> | US           | C      | 9    |
| Chicken (breast skin)     | Pechuga de pollo con piel | FR             | wd                 |         |              | 25.0        | 0.00         | 0.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup> | US           | C      | 9    |
| Chicken (breast skin)     | Pechuga de pollo con piel | BA             | wd                 |         |              | 36.0        | 0.00         | 0.00           |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup> | US           | C      | 9    |
| Chicken (breast)          | Pechuga de pollo          | NA             | na                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 2               | 1998 | Knize et al. <sup>16</sup> | US           | C      | 16   |
| Chicken (breast)          | Pechuga de pollo          | BA             | na                 |         |              | 270         | 0.00         | 3.10           | 170       |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup> | US           | C      | 9    |
| Chicken (dark meat)       | Pollo (carne oscura)      | GR             | na                 |         |              | 0.59        | 0.40         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Chicken (fast breast)     | Pechuga de pollo          | NA             | na                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 2               | 1998 | Knize et al. <sup>16</sup> | US           | C      | 16   |
| Chicken (fast food)       | Pollo (comida rápida)     | NA             | na                 |         |              | nd          | nd           | nd             |           |           |             | mn    | HPLC-FL          | 1               | 1995 | Knize et al. <sup>8</sup>  | US           | D      | 8    |

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| Food                         | Alimento                              | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                          | Country Code | Source | Ref. |
|------------------------------|---------------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------|--------------|--------|------|
|                              |                                       | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo |      |                                 |              |        |      |
| Chicken (from sandwich)      | Pollo (en sandwich)                   | BR             | na                 |         |              | 0.66        | 0.48         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>      | US           | D      | 16   |
| Chicken (gravy)              | Pollo en salsa                        | BK             | na                 |         |              | 0.00        | 0.57         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>      | US           | C      | 9    |
| Chicken (marinated)          | Pollo marinado                        | GR             | na                 |         | 14-26        |             |              |                |           |           |             | n.a   | NA               | 4               | 1997 | Knize et al. <sup>56</sup>      | SE           | C      | 7    |
| Chicken (non skin)           | Pollo sin piel                        | FR             | me                 | 200     |              | 0.20        | 0.11         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>    | NZ           | D      | 32   |
| Chicken (non skin)           | Pollo sin piel                        | FR             | wd                 | 200     |              | 17.5        | 2.27         | 2.26           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>    | NZ           | D      | 32   |
| Chicken (nuggets)            | Croquetas de pollo                    | NA             | na                 | 20      |              | 0.10        | 0.20         | 0.40           |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>   | DE           | D      | 29   |
| Chicken (pan residues)       | Pollo (restos en la sartén)           | ROA            | na                 | 175     |              | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>      | US           | C      | 7    |
| Chicken (pan residues)       | Pollo (restos en la sartén)           | FR             | na                 | 150-225 | 15           | 0.02-1.00   | 0.08-0.60    | nd-0.30        |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>      | US           | C      | 7    |
| Chicken (pan residues)       | Pollo (restos en la sartén)           | GR             | na                 | 150-200 | 30           | 0.09-0.60   | nd-0.02      | nd-0.01        |           |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>      | US           | C      | 7    |
| Chicken (thigh leg)          | Pierna de pollo                       | NA             | na                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 1998 | Knize et al. <sup>16</sup>      | US           | C      | 9    |
| Chicken (white meat)         | Pollo (carne blanca)                  | GR             | na                 |         |              | 0.75        | 0.45         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>      | US           | D      | 16   |
| Chicken liver (pan residues) | Higado de pollo (restos en la sartén) | FR             | na                 | 190     | 9            | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 2002 | Solyakov and Skog <sup>60</sup> | SE           | C      | 59   |
| Duck                         | Pato                                  | ROA            | na                 | 20      |              | 3.10        | 2.40         | 0.20           |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>   | DE           | D      | 29   |
| Ham                          | Jamón                                 | FR             | me                 | 175     | 5            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>      | US           | D      | 31   |
| Ham                          | Jamón                                 | FR             | vwd                | 176     | 19           | nd          | 1.80         |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>      | US           | D      | 31   |
| Ham                          | Jamón                                 | FR             | wd                 | 176     | 12           | 0.30        | 0.60         |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>      | US           | D      | 31   |
| Ham (pork steak)             | Filete de jamón de cerdo              | FR             | na                 |         |              | 5.70        | 1.60         | 0.00           | 0.00      |           |             | n.a   | NA               | 4               | 1995 | Sinha et al. <sup>37</sup>      | US           | C      | 9    |
| Ham slice                    | Loncha jamón                          | FR             | vwd                |         |              | 0.00        | 1.80         | 0.20           |           | 0.60      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>      | US           | C      | 9    |
| Ham slice                    | Loncha jamón                          | BR             | vwd                |         |              | 0.00        | 0.35         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>      | US           | C      | 9    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                   | Alimento                    | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                        | Country Code | Source | Ref. |
|------------------------|-----------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-------------------------------|--------------|--------|------|
|                        |                             | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo |      |                               |              |        |      |
| Ham slice              | Loncha jamón                | BR             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Ham slice              | Loncha jamón                | FR             | wd                 |         |              | 0.30        | 0.60         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>    | US           | C      | 9    |
| Hamburger              | Hamburguesa                 | NA             | na                 | 20      |              | 0.40        | 0.40         | nd             |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup> | DE           | D      | 29   |
| Hamburger (fast-food)  | Hamburguesa (comida rápida) | NA             | na                 |         |              | 0.23        | 0.15         | 0.017          |           |           |             | mn    | HPLC-FL          | 1               | 1995 | Knize et al. <sup>8</sup>     | US           | D      | 8    |
| Hamburger (restaurant) | Hamburguesa de restaurante  | GD             | me                 |         |              | 1.90        | 1.50         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Hamburger (restaurant) | Hamburguesa de restaurante  | BA             | me                 |         |              | 5.20        | 0.20         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Hamburger (restaurant) | Hamburguesa de restaurante  | BA             | vwd                |         |              | 18.4        | 1.80         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Hamburger (restaurant) | Hamburguesa de restaurante  | GD             | vwd                |         |              | 2.60        | 1.30         | 0.10           |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Hamburger (restaurant) | Hamburguesa de restaurante  | BA             | wd                 |         |              | 1.80        | 0.40         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |
| Hamburger (restaurant) | Hamburguesa de restaurante  | GD             | wd                 |         |              | 4.40        | 1.80         | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup>    | US           | D      | 16   |

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| Food                           | Alimento                        | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                      | Country Code | Source | Ref. |
|--------------------------------|---------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-----------------------------|--------------|--------|------|
|                                |                                 | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                       | Código País  | Fuente |      |
| Hamburguer (commercial frozen) | Hamburguesa comercial congelada | MW             | na                 |         | 12           | 0.10        | nd           |                |           | nd        |             | mn    | HPLC-MS          | 3               | 1997 | Holder et al. <sup>30</sup> | UK           | D      | 30   |
| Hotdog                         | Frankfurt                       | FR             | me                 | 175     | 4            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BK             | me                 | 180     | 3            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BA             | me                 | 232     | 5            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BR             | vwd                |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | BA             | vwd                |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | FR             | vwd                |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | FR             | vwd                | 177     | 18           | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BK             | vwd                | 185     | 10           | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BA             | vwd                | 252     | 15           | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BR             | wd                 |         |              | 0.00        | 0.19         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | BA             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | FR             | wd                 |         |              | 0.00        | 0.10         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup>  | US           | C      | 9    |
| Hotdog                         | Frankfurt                       | FR             | wd                 | 177     | 9            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BK             | wd                 | 182     | 6            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BA             | wd                 | 260     | 8            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | BO             | wd                 | 100     | 5            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>  | US           | D      | 31   |
| Hotdog                         | Frankfurt                       | FR             | me                 |         |              | 1.90        | 0.23         |                |           | 0.53      |             | mn    | HPLC-MS          | 3               | 1997 | Holder et al. <sup>30</sup> | UK           | D      | 30   |
| Hotdog (turkey)                | Frankfurt de pavo               | FR             | me                 |         |              | 4.40        | 4.20         |                |           | 0.51      |             | mn    | HPLC-MS          | 3               | 1997 | Holder et al. <sup>30</sup> | UK           | D      | 30   |

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| Food                       | Alimento                                 | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                           | Country Code | Source | Ref. |
|----------------------------|--|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|----------------------------------|--------------|--------|------|
|                            |  | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                            | Código País  | Fuente |      |
| Lamb (chops)               | Chuleta de cordero                       | FR             | na                 | 150-225 | 9            | nd-1.50     | nd-0.40      | nd-0.60        |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Lamb (chops, pan residues) | Chuleta de cordero (restos en la sartén) | FR             | na                 | 150-225 | 9            | < 0.01-2.30 | 0.08-0.60    | 0.04-0.30      |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Lamb (mutton)              | Carne de cordero                         | GR             | na                 |         |              |             |              | 0.67           |           |           |             | n.a   | NA               | 4               | 1993 | Wakabayashi et al. <sup>45</sup> | JP           | C      | 7    |
| Lamb/mutton (chops)        | Costilla de cordero                      | FR             | me                 | 200     |              | 0.00        | 0.40         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>     | NZ           | D      | 32   |
| Lamb/mutton (chops)        | Costilla de cordero                      | FR             | wd                 | 200     |              | 2.40        | 1.00         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>     | NZ           | D      | 32   |
| Meat (commercial extract)  | Extracto de carne comercial              | NA             | na                 |         |              |             | nd           | nd             |           | nd        |             | mn    | CZE              | 2               | 1998 | Mardones et al. <sup>27</sup>    | ES           | D      | 27   |
| Meat (cuts)                | Tacos de carne                           | NA             | na                 |         |              | nd          | nd-0.40      | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Stavric et al. <sup>57</sup>     | CA           | C      | 7    |
| Meat (extract)             | Extracto de carne                        | NA             | na                 |         |              | nd-7.50     | 29.0-46.0    | 4.80-6.20      |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>        | SE           | C      | 7    |
| Meat (sauce)               | Carne en salsa                           | FR             | na                 | 150-225 | 6            | 0.07-2.10   | nd-1.10      | nd-0.4         |           | nd        | nd          | n.a   | NA               | 4               | 1998 | Skog et al. <sup>7</sup>         | SE           | C      | 7    |
| Meat (steak)               | Filete de carne                          | FR             | me                 |         |              | 0.60        | 0.50         | 0.10           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>      | UK           | D      | 28   |



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| Food                     | Alimento                              | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                                | Country Code | Source | Ref. |
|--------------------------|---------------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------------|--------------|--------|------|
|                          |                                       | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                                 | Código País  | Fuente |      |
| Meatballs                | Albóndigas                            | FR             | na                 | 150-225 | 7.5          | nd-0.10     | nd-0.80      | nd-0.30        |           | nd        | nd          | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Meatballs                | Albóndigas                            | NA             | na                 | 20      |              | nd          | 0.20         | nd             |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>         | DE           | D      | 29   |
| Meatballs                | Albóndigas                            | FR             | na                 |         |              | 0.14        | 0.39         | 0.09           |           | 5.00      |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>             | US           | C      | 9    |
| Meatballs (pan residues) | Albóndigas (restos en la sartén)      | FR             | na                 | 150-225 | 7.5          | 0.03-0.50   | 0.02-0.70    | 0.02-0.10      |           | 0.05      | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Meatloaf                 | Pastel de carne                       | GR             | na                 | 150     | 55           | 0.30        | 0.10         | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Meatloaf (pan residues)  | Pastel de carne (restos en la sartén) | GR             | na                 | 150     | 55           | nd          | 0.04         | 0.03           |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Ox                       | Buey                                  | ROA            | na                 | 20      |              | 0.50        | 5.20         | 0.40           |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>         | DE           | D      | 29   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | me                 | 200     |              | 0.00        | 0.29         | 0.03           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | na                 |         |              | 16.4        | 2.20         | 0.70           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>           | UK           | D      | 28   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | na                 | 275     | 5            |             | 2.70         | nd             |           | 0.30      |             | mn    | HPLC-MS          | 3               | 1988 | Turesky et al. <sup>26</sup>          | CH           | D      | 26   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | na                 | 275     | 10           |             | 4.20         | nd             |           | 0.30      |             | mn    | HPLC-MS          | 3               | 1988 | Turesky et al. <sup>26</sup>          | CH           | D      | 26   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | na                 | 275     | 15           |             | 12.3         | 3.90           |           | 1.90      |             | mn    | HPLC-MS          | 3               | 1988 | Turesky et al. <sup>26</sup>          | CH           | D      | 26   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | FR             | wd                 | 200     |              | 3.96        | 1.12         | 0.29           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Patty (beef)             | Hamburguesa de carne de vaca/buey     | NA             | na                 |         |              | nd          | nd           | nd             |           |           |             | mn    | GC               | 2               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | D      | 11   |
| Pork                     | Cerdo                                 | NE             | na                 |         |              | 0-0.10      | 0.00-5.00    |                | 0.00-15.0 |           |             | p     | NA               | 4               | 2002 | Skog et al. <sup>2</sup>              | SE           | C      | 2    |
| Pork                     | Cerdo                                 | FR             | na                 | 200     |              |             | nd-0.40      |                |           | nd        | nd          | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>             | SE           | C      | 7    |
| Pork                     | Cerdo                                 | GR             | na                 |         |              | 0.75        | 0.12         | 0.055          |           |           |             | mn    | GC               | 2               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | D      | 11   |
| Pork                     | Cerdo                                 | GR             | na                 |         |              |             |              |                |           |           |             | mn    | GC               | 2               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | D      | 11   |
| Pork                     | Cerdo                                 | GR             | na                 |         |              | nd-3.80     |              |                |           | 0.10      | nd          | n.a   | NA               | 4               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | C      | 7    |

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| Food                      | Alimento                                     | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                        | Country Code | Source | Ref. |
|---------------------------|--|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-------------------------------|--------------|--------|------|
|                           |  | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                         | Código Pais  | Fuente |      |
| Pork                      | Cerdo  | BA             | na                 |         |              | 4.20        | 0.40         | 0.10           |           |           |             | mn    | GC-MS            | 3               | 1993 | Murray et al. <sup>28</sup>   | UK           | D      | 28   |
| Pork                      | Cerdo  | NA             | na                 | 20      |              | 0.40        | 1.30         | 0.30           |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup> | DE           | D      | 29   |
| Pork (belly pan residues) | Ventre de cerdo (callos) restos en la sartén | FR             | na                 |         |              | 1.98        | 0.52         | 0.05           |           | 0.10      |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>     | SE           | C      | 9    |
| Pork (belly)              | Ventre de cerdo (callos)                     | FR             | na                 | 150-225 | 3            | 0.02-12.4   | nd-2.90      | nd-0.70        |           | 0.10      | 0.10        | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>     | SE           | C      | 7    |
| Pork (belly)              | Ventre de cerdo (callos)                     | FR             | na                 |         |              | 3.35        | 0.82         | 0.70           |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>     | SE           | C      | 9    |
| Pork (belly pan residues) | Ventre de cerdo (callos) restos en la sartén | FR             | na                 | 150-225 | 3            | 0.04-4.00   | nd-0.90      | nd-0.20        |           | nd        | nd          | n.a   | NA               | 4               | 1993 | Tikkanen et al. <sup>11</sup> | FI           | C      | 7    |
| Pork (chop)               | Chuleta de cerdo                             | FR             | me                 | 175     | 5            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>    | US           | D      | 31   |
| Pork (chop)               | Chuleta de cerdo                             | FR             | na                 |         |              | 1.21        | 0.75         | 0.29           |           |           |             | n.a   | NA               | 4               | 1996 | Skog et al. <sup>21</sup>     | SE           | C      | 9    |
| Pork (chop)               | Chuleta de cerdo                             | FR             | na                 | 150-225 | 8.5          | nd-4.80     | nd-2.60      | nd-1.10        |           | nd        | nd          | n.a   | NA               | 4               | 1998 | Skog et al. <sup>21</sup>     | SE           | C      | 7    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                       | Alimento                               | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                     | Country Code | Source | Ref. |
|----------------------------|--|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|----------------------------|--------------|--------|------|
|                            |  | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo |      |                            |              |        |      |
| Pork (chop)                | Chuleta de cerdo                       | BR             | vwd                |         |              | 0.00        | 0.52         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup> | US           | C      | 9    |
| Pork (chop)                | Chuleta de cerdo                       | FR             | vwd                |         |              | 0.00        | 3.83         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup> | US           | C      | 9    |
| Pork (chop)                | Chuleta de cerdo                       | FR             | vwd                | 176     | 15           | nd          | 3.80         |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup> | US           | D      | 31   |
| Pork (chop)                | Chuleta de cerdo                       | BR             | wd                 |         |              | 0.00        | 0.00         | 0.00           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup> | US           | C      | 9    |
| Pork (chop)                | Chuleta de cerdo                       | FR             | wd                 |         |              | 0.00        | 1.34         | 0.20           |           | 0.00      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup> | US           | C      | 9    |
| Pork (chop)                | Chuleta de cerdo                       | FR             | wd                 | 176     | 9            | nd          | 1.30         |                |           |           |             | mn    | HPLC-MS          | 1               | 1998 | Sinha et al. <sup>31</sup> | US           | D      | 31   |
| Pork (chop, pan residues)  | Chuleta de cerdo (restos en la sartén) | FR             | na                 |         |              | 1.75        | 1.12         | 0.25           |           | 0.10      |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>  | SE           | C      | 9    |
| Pork (chop, pan residues)  | Chuleta de cerdo (restos en la sartén) | FR             | na                 | 150-225 | 8.5          | 0.02-3.80   | nd-1.90      | nd-0.50        |           | nd        | nd          | n.a   | NA               | 4               | 1998 | Knize et al. <sup>56</sup> | SE           | C      | 7    |
| Pork (cubes)               | Cubos de cerdo estofado                | STW            | na                 | 150-225 | 5            | nd-0.10     | nd-0.70      | nd-0.20        |           | 0.10      | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>  | SE           | C      | 7    |
| Pork (cubes, pan residues) | Cubos de cerdo (restos en la sartén)   | FR             | na                 | 150-225 | 5            | 0.04-1.80   | 0.03-2.60    | < 0.01-0.60    |           | 0.70      | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>  | SE           | C      | 7    |
| Pork (ground gravy)        | Cerdo (picado en salsa)                | FR             | na                 |         |              | 10.00       | 1.5          | 0.90           |           | 0.04      |             | n.a   | NA               | 4               | 2003 | Knize et al. <sup>17</sup> | US           | C      | 9    |
| Pork (rib)                 | Costilla de cerdo                      | BK             | me                 |         |              | 0.50        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | BK             | me                 |         |              | 0.50        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | SM             | me                 |         |              | 7.40        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | SM             | me                 |         |              | 7.40        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | SM             | wd                 |         |              | 0.70        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | SM             | wd                 |         |              | 0.70        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rib)                 | Costilla de cerdo                      | BK             | wd                 |         |              | 2.30        | nd           | nd             |           |           |             | mn    | HPLC-FL          | 2               | 1998 | Knize et al. <sup>16</sup> | US           | D      | 16   |
| Pork (rinds)               | Piel de cerdo                          | NA             | na                 |         |              | nd          | 0.42         | 0.10           |           | 0.60      | 1.30        | n.a   | NA               | 4               | 1997 | Knize et al. <sup>56</sup> | SE           | C      | 7    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                    | Alimento                   | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                                | Country Code | Source | Ref. |
|-------------------------|----------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------------|--------------|--------|------|
|                         |                            | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo |      |                                       |              |        |      |
| Pork (steak)            | Filete de cerdo            | FR             | me                 | 200     |              | 0.37        | 0.25         | 0.10           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Pork (steak)            | Filete de cerdo            | FR             | wd                 | 200     |              | 7.82        | 2.22         | 0.95           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Reindeer                | Reno                       | FR             | na                 | 150-225 | 5            | 0.40-5.80   | nd-1.00      | nd             |           | 0.30      | 2.30        | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Reindeer (pan residues) | Reno (restos en la sartén) | FR             | na                 | 150-225 | 5            | nd-3.50     | 0.10-0.80    | 0.03-0.60      |           | 1.60      | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Sausage                 | Frankfurt                  | FR             | me                 | 200     |              | 0.00        | 0.36         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Sausage                 | Frankfurt                  | FR             | na                 | 160     | 6            | 0.10        | 0.7          | 0.20           |           | nd        |             | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Sausage                 | Frankfurt                  | FR             | na                 |         |              | 0.1         | 0.70         | 0.20           |           | 0.10      | 0.20        | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | US           | C      | 9    |
| Sausage                 | Frankfurt                  | FR             | wd                 | 200     |              | 0.61        | 0.07         | 0.00           |           |           |             | mn    | HPLC             | 1               | 1999 | Norrish et al. <sup>32</sup>          | NZ           | D      | 32   |
| Sausage                 | Frankfurt                  | NA             | na                 |         |              | nd          | 0.10         | nd             |           |           |             | mn    | HPLC-FL          | 1               | 1995 | Knize et al. <sup>8</sup>             | US           | D      | 8    |
| Sausage (cocktail)      | Frankfurt (cocktail)       | FR             | na                 |         |              | 0.06-0.10   | nd-0.10      | nd             |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |

## MEAT AND MEAT PRODUCTS / CARNES Y DERIVADOS

| Food                             | Alimento                                  | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                                | Country Code | Source | Ref. |
|----------------------------------|---|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------------|--------------|--------|------|
|                                  |   | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                                 | Código País  | Fuente |      |
| Sausage (cocktail, pan residues) | Frankfurt (cocktail, restos en la sartén) | FR             | na                 |         |              | < 0.01-0.02 | nd-0.02      | nd             |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Sausage (Falun)                  | Salchicha (Falun)                         | BK             | na                 | 150-225 | 5            | nd          | nd           | nd             |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>             | SE           | C      | 7    |
| Sausage (Falun)                  | Salchicha (Falun)                         | FR             | na                 | 150-225 | 2            | nd          | 0.60         |                |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>             | SE           | C      | 7    |
| Sausage (Falun)                  | Salchicha (Falun)                         | FR             | na                 | 200     | 30           | nd-0.10     | nd           | nd-0.07        |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Sausage (Falun, pan residues)    | Salchicha (Falun, restos en la sartén)    | BK             | na                 | 150-225 | 5            | nd          | < 0.01       | < 0.01         |           |           |             | n.a   | NA               | 4               | 1995 | Skog et al. <sup>21</sup>             | SE           | C      | 7    |
| Sausage (Falun, pan residues)    | Salchicha (Falun, restos en la sartén)    | FR             | na                 | 200     | 30           | 0.06-0.40   | 0.03-0.20    | 0.04-0.10      |           |           |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Sausage (links)                  | Salchicha                                 | FR             | me                 | 175     | 9            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Sausage (links)                  | Salchicha                                 | FR             | vwd                | 177     | 21           | 1.30        | 0.10         |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Sausage (links)                  | Salchicha                                 | FR             | wd                 | 177     | 15           | 0.40        | nd           |                |           |           | nd          | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Sausage (Merguez)                | Salchicha (Merguez)                       | NE             | na                 |         |              | nd          | 1.80         | 1.90           |           |           |             | n.a   | NA               | 4               | 1997 | Fay et al. <sup>38</sup>              | CH           | C      | 7    |
| Sausage (Mesquite)               | Salchicha (Mesquite)                      | NA             | na                 |         |              | 0.40        | 26.0         |                |           |           |             | n.a   | NA               | 4               | 1996 | Holder et al. <sup>39</sup>           | SE           | C      | 7    |
| Sausage (pan residues)           | Frankfurt (restos en la sartén)           | FR             | na                 | 160     | 2,5          | nd          | 2.50         | < 0.10         |           | 0.10      |             | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Sausage (patties)                | Hamburguesa de salchicha                  | FR             | me                 | 175     | 8            | nd          | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Sausage (patties)                | Hamburguesa de salchicha                  | FR             | vwd                | 179     | 21           | 5.40        | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Sausage (patties)                | Hamburguesa de salchicha                  | FR             | wd                 | 176     | 14           | 1.60        | nd           |                |           |           |             | mn    | HPLC-UV          | 1               | 1998 | Sinha et al. <sup>31</sup>            | US           | D      | 31   |
| Shish-kebab                      | Carne entrichada (oveja o carnero)        | GR             | na                 | 20      |              | nd          | 0.10         | nd             |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>         | DE           | D      | 29   |
| Turkey (breast)                  | Pechuga de pavo                           | FR             | na                 |         | 20           | 3.80        | 1.40         | 0.40           |           | 1.10      | 0.90        | mn    | HPLC-FL          | 3               | 1997 | Murkovic et al. <sup>10</sup>         | AV           | D      | 10   |

## FISH / PESCADO

| Food                           | Alimento                              | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                                | Country Code | Source | Ref. |
|--------------------------------|---------------------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|---------------------------------------|--------------|--------|------|
|                                |                                       | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                                 | Código País  | Fuente |      |
| Fish                           | Pescado                               | NE             | na                 |         |              | 0.00-1000   | 0.00-200     |                | 0.00-500  |           |             | p     | NA               | 4               | 2002 | Skog et al. <sup>2</sup>              | SE           | C      | 2    |
| Fish                           | Pescado                               | GR             | na                 |         |              | 1.625       | 0.0025       | nd             |           |           |             | mn    | GC               | 2               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | D      | 11   |
| Fish                           | Pescado                               | BA             | na                 |         |              | < 0.100     | nd-0.03      | nd             |           |           |             | n.a   | NA               | 4               | 1993 | Tikkanen et al. <sup>11</sup>         | FI           | C      | 7    |
| Fish                           | Pescado                               | GR             | na                 |         |              | 7.40        | < 0.10       |                |           | 53.2      |             | n.a   | NA               | 4               | 1996 | Wu et al. <sup>23</sup>               | CN           | C      | 7    |
| Fish (fast food)               | Pescado (comida rápida)               | NA             | na                 |         |              | nd          | nd           | nd             |           |           |             | mn    | HPLC-FL          | 1               | 1995 | Knize et al. <sup>8</sup>             | US           | D      | 8    |
| Herring (baltic)               | Arenque báltico                       | NE             | na                 |         |              | nd          | 0.60         | 0.30           |           | 0.20      | nd          | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | C      | 7    |
| Herring (baltic)               | Arenque báltico                       | FR             | na                 | 150-225 | 2            | 0.06-0.30   | nd-0.20      | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Herring (baltic, pan residues) | Arenque báltico (restos en la sartén) | FR             | na                 | 150-225 | 2            | < 0.01      | nd-0.10      | nd             |           | nd        |             | n.a   | NA               | 4               | 1997 | Skog et al. <sup>40</sup>             | SE           | C      | 7    |
| Mackerel (flesh)               | Caballa (carne)                       | NA             | na                 |         |              | 0.23        | nd           | nd             |           | nd        | 0.07        | mn    | GC               | 1               | 2002 | Kataoka et al. <sup>58</sup>          | JP           | D      | 58   |
| Mackerel (skin)                | Caballa (piel)                        | NA             | na                 |         |              | 1.60        | 0.59         | 1.20           |           | nd        | 0.38        | mn    | GC               | 1               | 2002 | Kataoka et al. <sup>58</sup>          | JP           | C      | 58   |
| Pike-perch                     | Lucio                                 | NA             | na                 | 20      |              | nd          | 0.10         | nd             |           | nd        |             | mn    | HPLC-MS          | 2               | 1998 | Richling et al. <sup>29</sup>         | DE           | C      | 29   |
| Salmon                         | Salmón                                | BK             | na                 | 200     | 30           | 1.70-23.0   | nd-4.60      |                |           | 0.05-0.20 | nd          | n.a   | NA               | 4               | 1992 | Gross and Gruter <sup>22</sup>        | CH           | C      | 7    |
| Salmon                         | Salmón                                | FR             | na                 | 200     | 7.5          | nd-18.0     | 1.40-50.0    |                |           | nd        | nd          | n.a   | NA               | 4               | 1992 | Gross and Gruter <sup>22</sup>        | CH           | D      | 7    |
| Salmon                         | Salmón                                | FR             | na                 | 150     | 9            | 3.00        | 0.60         | 0.20           |           | nd        | nd          | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | D      | 7    |
| Salmon                         | Salmón                                | SM             | na                 |         |              | nd          | 1.30         | nd             |           | nd        | nd          | n.a   | NA               | 4               | 1994 | Johansson and Jagerstad <sup>20</sup> | SE           | D      | 7    |
| Salmon                         | Salmón                                | BK             | na                 |         | 30           |             | nd           | nd             |           | nd        |             | mn    | CZE              | 2               | 1998 | Mardones et al. <sup>27</sup>         | ES           | D      | 27   |
| Salmon (flesh)                 | Salmón (carne)                        | NA             | na                 |         |              | 0.294       | 0.099        | nd             |           | nd        | 0.18        | mn    | GC               | 1               | 2002 | Kataoka et al. <sup>58</sup>          | JP           | D      | 58   |

ALCOHOLIC BEVERAGES / BEBIDAS ALCOHÓLICAS

| Food         | Alimento               | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                        | Country Code | Source | Ref. |
|--------------|------------------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-------------------------------|--------------|--------|------|
|              |                        | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                         | Código País  | Fuente |      |
| Wine (black) | Vino negro             | NP             | np                 |         |              | 26.0        |              |                |           |           |             | mn    | HPLC             | 1               | 1993 | Manabe et al. <sup>35</sup>   | JP           | D      | 35   |
| Wine (white) | Vino blanco            | NP             | np                 |         |              | 38.5        |              |                |           |           |             | mn    | HPLC             | 1               | 1993 | Manabe et al. <sup>35</sup>   | JP           | D      | 35   |
| Wine (n.e)   | Vino (sin especificar) | NP             | np                 |         |              | 41.5        |              |                |           |           |             | mn    | HPLC             | 2               | 1997 | Richling et al. <sup>36</sup> | DE           | D      | 36   |

NON ALCOHOLIC BEVERAGES / BEBIDAS NO ALCOHÓLICAS

| Food           | Alimento      | Cooking method | Degree of doneness | Temp °C | Time (min)   | PhIP (ng/g) | MeIQx (ng/g) | DiMeIQx (ng/g) | AC (ng/g) | IQ (ng/g) | MeIQ (ng/g) | Value | Analytic method  | Sample method   | Year | Author                        | Country Code | Source | Ref. |
|----------------|---------------|----------------|--------------------|---------|--------------|-------------|--------------|----------------|-----------|-----------|-------------|-------|------------------|-----------------|------|-------------------------------|--------------|--------|------|
|                |               | Método cocción | Grado de cocción   |         | Tiempo (min) |             |              |                |           |           |             | Valor | Método analítico | Método muestreo | Año  | Autor                         | Código Pais  | Fuente |      |
| Coffee (beans) | Café en grano | NA             | na                 |         |              |             |              |                |           |           | 0.083       | mn    | HPLC             | 3               | 1989 | Kikugawa et al. <sup>33</sup> | JP           | D      | 33   |
| Coffee (beans) | Café en grano | NA             | na                 |         |              |             |              |                |           |           | nd          | mn    | HPLC             | 4               | 1991 | Gross et al. <sup>34</sup>    | CH           | D      | 34   |



## REFERENCES / REFERENCIAS

1. Thiebaud HP, Knize MG, Kuzmicky PA, Felton JS, Hsieh DP. Mutagenicity and chemical analysis of fumes from cooking meat. *J Agric Food Chem* 1994;42:1502-10.
2. Skog K. Problems associated with the determination of heterocyclic amines in cooked foods and human exposure. *Food Chem Toxicol* 2002;40:1197-203.
3. Johansson MA, Fredholm L, Bjerne I, Jagerstad M. Influence of frying fat on the formation of heterocyclic amines in fried beefburgers and pan residues. *Food Chem Toxicol* 1995;33:993-1004.
4. Solyakov A, Skog K. Screening for heterocyclic amines in chicken cooked in various ways. *Food Chem Toxicol* 2002;40:1205-11.
5. Bogen KT, Keating GA. U.S. dietary exposures to heterocyclic amines. *J Expo Anal Environ Epidemiol* 2001;11:155-68.
6. Sinha R, Rothman N, Salmon CP, Knize MG, Brown ED, Swanson CA, et al. Heterocyclic amine content in beef cooked by different methods to varying degrees of doneness and gravy made from meat drippings. *Food Chem Toxicol* 1998;36:279-87.
7. Skog KI, Johansson MA, Jagerstad MI. Carcinogenic heterocyclic amines in model systems and cooked foods: a review on formation, occurrence and intake. *Food Chem Toxicol* 1998;36:879-96.
8. Knize MG, Sinha R, Rothman N, Brown ED, Salmon CP, Levander OA, et al. Heterocyclic amine content in fast-food meat products. *Food Chem Toxicol* 1995;33:545-51.
9. Hatch,F, Lawrence Livermore National Lab. Mutagens in cooked foods database (<http://greengenes.llnl.gov/mutagens>). (1996)
10. Murkovic M, Friedrich M. Heterocyclic aromatic amines in fried poultry meat. *Z Lebensm Unters Forsch* 1997;205:347-50.
11. Tikkanen LM, Sauri TM, Latva-Kala KJ. Screening of heat-processed Finnish foods for the mutagens 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline, 2-amino-3,4,8- trimethylimidazo[4,5-f]quinoxaline and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine. *Food Chem Toxicol* 1993;31:717-21.
12. Felton JS, Knize MG. Heterocyclic-amine mutagens/carcinogens in foods. In: C.S.Cooper and P.L.Grover ed. *Hadbook Exptl. Pharmacology*. Springer Verlag, Berlin,(1990) 471-502.
13. Felton JS, Knize MG. Occurrence, identification, and bacterial mutagenicity of heterocyclic amines in cooked food. *Mutat Res* 1991;259:205-17.
14. Sugimura T, Sato S, Wakabayashi H. Mutagens/carcinogens in pyrolysates of amino acids and proteins and in cooked foods: Heterocyclic aromatic amines. In: Woo YT, Lai DY, Arcos JC, Argus MF eds. *Chemical Induction of Cancer, Structural Bases and Biological Mechanisms*. Academic Press Inc., NY,(1988);681-710.
15. Hayatsu H, Arimoto S, Wakabayashi K. Methods for separation and detection of heterocyclic amines. In: Hayatsu H ed. *Mutagens in Food, Detection and Prevention*. CRC Press, Boco Ratan, Ann Arbor, Boston,(1991);101-112.
16. Knize MG, Sinha R, Brown ED, Salmon CP, Levander OA, Felton JS, et al. Heterocyclic amine content in restaurant-cooked hamburgers, steaks, ribs, and chicken. *J Agric Food Chem* 1998;46(11):4648-51.

17. Knize, MG, Felton, JS, Lawrence Livermore National Lab., Sinha, R, Rothman, N, Epidemiology and Biostatistics Program et al. Collaborative study, unpublished. (2003)
18. Gross GA, Turesky RJ, Fay LB, Stillwell WG, Skipper PL, Tannenbaum SR. Heterocyclic aromatic amine formation in grilled bacon, beef and fish and in grill scrapings. *Carcinogenesis* 1993;14:2313-8.
19. Felton JS, Fultz E, Dolbeare FA, Knize MG. Effect of microwave pretreatment on heterocyclic aromatic amine mutagens/carcinogens in fried beef patties. *Food Chem Toxicol* 1994;32:897-903.
20. Johansson MA, Jagerstad M. Occurrence of mutagenic/carcinogenic heterocyclic amines in meat and fish products, including pan residues, prepared under domestic conditions. *Carcinogenesis* 1994;15:1511-8.
21. Skog K, Steineck G, Augustsson K, Jagerstad M. Effect of cooking temperature on the formation of heterocyclic amines in fried meat products and pan residues. *Carcinogenesis* 1995;16:861-7.
22. Gross GA, Gruter A. Quantitation of mutagenic/carcinogenic heterocyclic aromatic amines in food products. *J Chromatogr* 1992;592:271-8.
23. Wu J, Wong MK, Lee HK, Lee BL, Shi CY, Ong CN. Determination of heterocyclic amines in flame-grilled fish patty by capillary electrophoresis. *Food Addit Contam* 1996;13:851-61.
24. Johansson MA, Fredholm L, Bjerne I, Jagerstad M. Influence of frying fat on the formation of heterocyclic amines in fried beefburgers and pan residues. *Food Chem Toxicol* 1995;33:993-1004.
25. Thiebaud HP, Knize MG, Kuzmicky PA, Hsieh DP, Felton JS. Airborne mutagens produced by frying beef, pork and a soy-based food. *Food Chem Toxicol* 1995;33:821-8.
26. Turesky RJ, Bur H, Huynh-Ba T, Aeschbacher HU, Milon H. Analysis of mutagenic heterocyclic amines in cooked beef products by high-performance liquid chromatography in combination with mass spectrometry. *Food Chem Toxicol* 1988;26:501-9.
27. Mardones C, Arce L, Rios A, Valcarcel M. Determination of Heterocyclic aromatic amines in fried beefsteak, meat extract, and fish by capillary zone electrophoresis. *Chromatographia* 1998;48(9/10):700-7.
28. Murray S, Lynch AM, Knize MG, Gooderham MJ. Quantification of the carcinogens 2-amino-3,8-dimethyl-and 2-amino-3,4,8-trimethylimidazo[4,5-f]quinoxaline and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine in food using a combined assay based on gas chromatography-negative ion mass spectrometry. *J Chromatogr* 1993;616:211-9.
29. Richling E, Häring D, Herderich M, Schreier P. Determination of heterocyclic aromatic amines (HAA) in commercially available meat products and fish by high performance liquid chromatography - electrospray tandem mass spectrometry (HPLC-ESI-MS-MS). *Chromatographia* 1998;48(3/4):258-62.
30. Holder CL, Preece SW, Conway SC, Pu YM, Doerge DR. Quantification of heterocyclic amine carcinogens in cooked meats using isotope dilution liquid chromatography/atmospheric pressure chemical ionization tandem mass spectrometry. *Rapid Commun Mass Spectrom* 1997;11:1667-72.

31. Sinha R, Knize MG, Salmon CP, Brown ED, Rhodes D, Felton JS, et al. Heterocyclic amine content of pork products cooked by different methods and to varying degrees of doneness. *Food Chem Toxicol* 1998;36:289-97.
32. Norrish AE, Ferguson LR, Knize MG, Felton JS, Sharpe SJ, Jackson RT. Heterocyclic amine content of cooked meat and risk of prostate cancer. *J Natl Cancer Inst* 1999;91:2038-44.
33. Kikugawa K, Kato T, Takahashi S. Possible presence of 2-amino-3,4-dimethylimidazo[4,5-f]quinoline and other heterocyclic amine-like mutagens in roasted coffee beans. *J Agric Food Chem* 1989;37:881-6.
34. Gross GA, Wolleb U. 2-amino-3,4-dimethylimidazo[4,5-f]quinoline is not detectable in commercial instant and roasted coffees. *J Agric Food Chem* 1991;39:2231-6.
35. Manabe S, Suzuki H, Wada O, Ueki A. Detection of the carcinogen 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) in beer and wine. *Carcinogenesis* 1993;14:899-901.
36. Richling E, Decker C, Haring D, Herderich M, Schreier P. Analysis of heterocyclic aromatic amines in wine by high-performance liquid chromatography-electrospray tandem mass spectrometry. *J Chromatogr A* 1997;791:71-7.
37. Sinha R, Rothman N, Brown ED, Salmon CP, Knize MG, Swanson CA, et al. High concentrations of the carcinogen 2-amino-1-methyl-6-phenylimidazo- [4,5-b]pyridine (PhIP) occur in chicken but are dependent on the cooking method. *Cancer Res* 1995;55:4516-9.
38. Fay LB, Ali S, Gross GA. Determination of heterocyclic aromatic amines in food products: automation of the sample preparation method prior to HPLC and HPLC-MS quantification. *Mutat Res* 1997;376:29-35.
39. Holder CL, Cooper WM, Churchwell MI, Doerge DR, Thompson HC. Multi-residue determination and confirmation of ten heterocyclic amines in cooked meats. *J Muscle Foods* 1996;7:281-90.
40. Skog K, Augustsson K, Steineck G, Stenberg M, Jagerstad M. Polar and non-polar heterocyclic amines in cooked fish and meat products and their corresponding pan residues. *Food Chem Toxicol* 1997;35:555-65.
41. Rivera L, Curto MJ, Pais P, Galceran MT, Puignou L. Solid-phase extraction for the selective isolation of polycyclic aromatic hydrocarbons, azaarenes and heterocyclic aromatic amines in charcoal-grilled meat. *J Chromatogr A* 1996;731:85-94.
42. Knize MG, Sinha R, Salmon CP, Mehta SS, Dewhirst KP, Felton JS. Formation of heterocyclic amine mutagens/carcinogens during home and commercial cooking of muscle foods. *J Muscle Foods* 1996;7:271-9.
43. Galceran MT, Pais P, Puignou L. Isolation by solid-phase extraction and liquid chromatographic determination of mutagenic amines in beef extracts. *J Chromatogr A* 1996;719:203-12.
44. Ghoshal A, Snyderwine EG. Excretion of food-derived heterocyclic amine carcinogens into breast milk of lactating rats and formation of DNA adducts in the newborn. *Carcinogenesis* 1993;14:2199-203.
45. Wakabayashi K, Ushiyama H, Takahashi M, Nukaya H, Kim SB, Hirose M, et al. Exposure to heterocyclic amines. *Environ Health Perspect* 1993;99:129-34.

46. Puignou L, Casal J, Santos FJ, Galceran MT. Determination of heterocyclic aromatic amines by capillary zone electrophoresis in a meat extract. *J Chromatogr A* 1997;769:293-9.
47. Pais P, Moyano E, Puignou L, Galceran MT. Liquid chromatography-atmospheric pressure chemical ionization mass spectrometry as a routine method for the analysis of mutagenic amines in beef extracts. *J Chromatogr A* 1997;778:207-18.
48. Pais P, Moyano E, Puignou L, Galceran MT. Liquid chromatography-electrospray mass spectrometry with in-source fragmentation for the identification and quantification of fourteen mutagenic amines in beef extracts. *J Chromatogr A* 1997;775:125-36.
49. Reistad R, Rossland OJ, Latva-Kala KJ, Rasmussen T, Vikse R, Becher G, et al. Heterocyclic aromatic amines in human urine following a fried meat meal. *Food Chem Toxicol* 1997;35:945-55.
50. Thiebaud HP, Knize MG, Kuzmicky PA, Felton JS, Hsieh DP. Mutagenicity and chemical analysis of fumes from cooking meat. *J Agric Food Chem* 1994;42:1502-10.
51. Sinha R, Rothman N, Brown ED, Mark SD, Hoover RN, Caporaso NE, et al. Pan-fried meat containing high levels of heterocyclic aromatic amines but low levels of polycyclic aromatic hydrocarbons induces cytochrome P4501A2 activity in humans. *Cancer Res* 1994;54:6154-9.
52. Knize MG, Dolbeare FA, Carroll KL, Moore DH, Felton JS. Effect of cooking time and temperature on the heterocyclic amine content of fried beef patties. *Food Chem Toxicol* 1994;32:595-603.
53. Knize MG, Salmon CP, Hopmans EC, Felton JS. Analysis of foods for heterocyclic aromatic amine carcinogens by solid-phase extraction and high-performance liquid chromatography. *J Chromatogr A* 1997;763:179-85.
54. Johansson MA, Knize MG, Jagerstad M, Felton JS. Characterization of mutagenic activity in instant hot beverage powders. *Environ Mol Mutagen* 1995;25:154-61.
55. Johansson MA, Fredholm L, Bjerne I, Jagerstad M. Influence of frying fat on the formation of heterocyclic amines in fried beefburgers and pan residues. *Food Chem Toxicol* 1995;33:993-1004.
56. Knize MG, Salmon CP, Mehta SS, Felton JS. Analysis of cooked muscle meats for heterocyclic aromatic amine carcinogens. *Mutat Res* 1997;376:129-34.
57. Stavric B, Lau BP, Matula TI, Klassen R, Lewis D, Downie RH. Heterocyclic aromatic amine content in pre-processed meat cuts produced in Canada. *Food Chem Toxicol* 1997;35:199-206.
58. Kataoka H, Nishioka S, Kobayashi M, Hanaoka T, Tsugane S. Analysis of mutagenic heterocyclic amines in cooked food samples by gas chromatography with nitrogen-phosphorus detector. *Bull Environ Contam Toxicol* 2002;69:682-9.
59. Skog K, Solyakov. Heterocyclic amines in poultry products: a literature review. *Food and Chemical Toxicology* 2002; 40:1213-1221
60. Solyakov A, Skog K. Screening for heterocyclic amines in chicken cooked in various way. *Food and Chemical Toxicology* 2002; 40:1207-1212

