TECHNICAL REPORT

Effect on dietary exposure of an increase of the levels for aflatoxin total from 4 µg/kg to 10 µg/kg for dried figs

European Food Safety Authority

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SUMMARY

In an ad-hoc request, the European Commission asked the European Food Safety Authority (EFSA) to assess the difference in dietary exposure resulting from the consumption of dried figs under the current maximum levels for aflatoxin total (sum of aflatoxins B1, B2, G1 and G2) of 4 µg/kg and aflatoxin B1 of 2 µg/kg compared to a possible future maximum level of 10 µg/kg for aflatoxin total and 6 µg/kg for aflatoxin B1, taking into account dietary exposure from all possible sources.

For the evaluation of the dried figs contamination with aflatoxins, EFSA used the data on occurrence of aflatoxin B1, B2, G1 and G2 in 329 samples collected from 2007 onwards and available in the EFSA database. Information on the consumption of dried figs in European countries was available from the EFSA Comprehensive Food Consumption database and from the GEMS/Food cluster diets database. Depending on the source of information and dietary study, the average daily consumption of dried figs in adult population varied from 0.04 to 0.6 g/kg per person.

The contribution of dried figs to the total dietary exposure to aflatoxins under the current maximum levels was estimated at 0.5 % to 0.8 %. By increasing the maximum levels for aflatoxin total to 10 µg/kg (combined with a maximum of 6 µg/kg for aflatoxin B1) the contribution of dried figs to the total exposure would represent 0.6 % to 1.0 %.

An increase of the maximum level for aflatoxin total in dried figs from 4 µg/kg to 10 µg/kg would most likely result in an increase of the total aflatoxin dietary exposure in adult population by 0.15 % to 0.26 %. Such an increase can be considered marginal in comparison to the total aflatoxin exposure from all dietary sources. However, the recommendations of the CONTAM Panel expressed in the 2007 and 2009 scientific opinions with regard to reducing the number of highly contaminated foods reaching market, irrespective of the food commodity, should be considered in applying risk management decision on aflatoxins in food.

KEY WORDS

dried figs, aflatoxins, dietary exposure

1 On request from the European Commission, Question No EFSA-Q-2012-00681, approved on 9 July 2012.
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Aflatoxins in dried figs

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

Within the framework of the mandate “Request for continuous data collection and data analysis for nitrates, mycotoxins and dioxins and PCBs in food and for undesirable substances in feed” (EFSA-Q-2010-01126), the European Commission submitted an ad-hoc request to EFSA (Dietary and Chemical Monitoring Unit) to assess the difference in the dietary exposure between the current maximum level for aflatoxin total (sum of aflatoxins B1, B2, G1 and G2) of 4 µg/kg combined with a maximum level for aflatoxin B1 of 2 µg/kg or a possible future maximum level of 10 µg/kg for aflatoxin total in dried figs combined with a maximum level for aflatoxin B1 of 6 µg/kg. The difference should be estimated taking into account the exposure to aflatoxins in all sources.

ASSESSMENT

1. Introduction

The EFSA Scientific Panel on Contaminants in the Food Chain (CONTAM Panel) has adopted in 2007 a scientific opinion related to the potential increase in consumer health risk by a possible raising of the maximum levels for aflatoxins in almonds, hazelnuts and pistachios and derived products (EFSA, 2007). In 2009, the CONTAM Panel adopted another opinion on the effects on public health of an increase of the levels for aflatoxin total for tree nuts other than almonds, hazelnuts and pistachios (EFSA, 2009). Both assessments came to the conclusion that increasing the maximum levels for aflatoxins from 4 to 10 µg/kg would not adversely affect the public health. However, the CONTAM Panel recommended that exposure to aflatoxins from all sources should be as low as reasonably achievable, because aflatoxins are genotoxic and carcinogenic. The CONTAM Panel highlighted that priority should be given to reducing the number of highly contaminated foods reaching market, irrespective of the food commodity.

Commission Regulation (EC) 1881/2006 of 19 December setting maximum levels for certain contaminants in foodstuffs establishes for dried fruit and processed products thereof intended for direct human consumption or use as an ingredient in foodstuffs a maximum level for aflatoxin total (sum of aflatoxin B1, B2, G1 and G2) of 4 µg/kg and a maximum of 2 µg/kg for aflatoxin B1. Discussions are ongoing at international level on the possible increase of the maximum level for aflatoxin total in dried figs to 10 µg/kg and the maximum level for aflatoxin B1 to 6 µg/kg. The present report aims to evaluate the impact on the total long-term dietary exposure by consuming dried figs under the current regulation and under the possible future one.

2. Occurrence data

For this evaluation EFSA made use of the data on occurrence of aflatoxins collected from 2007 onwards. Information on the concentration of aflatoxins B1, B2, G1 and G2 in dried figs was available for a total of 329 samples. The distribution of dried fig samples in defined concentration ranges of total aflatoxin is presented in Table 1. It is to note that 18 % of the samples contained aflatoxin total above the current maximum levels. Dried fig samples were taken from retail, wholesale, processing plants and at import control but for 77 % of the samples, the sampling point was not specified. Therefore, it was not possible to make a clear cut between samples reflecting the contamination of dried figs available to the consumers and samples which eventually were not introduced on the market.

Therefore, in evaluating the impact of the increase of maximum levels for aflatoxins in dried figs it was assumed that all samples non-compliant with the current maximum levels for aflatoxin total and aflatoxin B1 were detected by food surveillance and prevented from reaching the market and therefore not consumed. This assumption does not fully reflect the true situation and occasionally dried figs...
non-compliant with the maximum levels may be consumed. However, since there is no information on which to base a more realistic scenario this assumption was considered as the best basis for a comparison of the current situation with a hypothetical future scenario.

Table 1: Number of dried figs and the distribution in defined concentration ranges of total aflatoxin (µg/kg) based on lower bound estimation.

<table>
<thead>
<tr>
<th>No of samples</th>
<th>&lt;LC</th>
<th>&gt;LC (≤ 4)</th>
<th>&gt; 4 (≤ 10)</th>
<th>&gt;10</th>
</tr>
</thead>
<tbody>
<tr>
<td>329</td>
<td>55%</td>
<td>27%</td>
<td>8.8%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

LC= left censoring limit (results below the limit of detection or below the limit of quantification)

To assess the contribution of dried figs to the dietary exposure to aflatoxins under current maximum levels (Scenario 4;2) a subset of data of dried fig samples containing aflatoxin total up to 4 µg/kg but aflatoxin B1 not higher than 2 µg/kg was extracted and evaluated (n = 255). For the hypothetical situation with maximum levels for aflatoxin total at 10 µg/kg and aflatoxin B1 at 6 µg/kg (Scenario 10;6), the subset data included samples containing maximum 10 µg/kg aflatoxin total but aflatoxin B1 not higher than 6 µg/kg (n = 295). The concentration of aflatoxin total in dried figs in the different data sets is presented in Table 2.

Table 2: Estimated total aflatoxin concentration (µg/kg) in dried figs for lower bound and upper bound.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of samples</th>
<th>Lower bound&lt;sup&gt;(c)&lt;/sup&gt;</th>
<th>Upper bound&lt;sup&gt;(d)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>4;2&lt;sup&gt;(a)&lt;/sup&gt;</td>
<td>255</td>
<td>0</td>
<td>0.28</td>
</tr>
<tr>
<td>10;6&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>295</td>
<td>0</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<sup>(a)</sup>: Scenario 4;2: samples containing in lower bound maximum 4 µg/kg aflatoxin total but aflatoxin B1 not higher than 2 µg/kg;

<sup>(b)</sup>: Scenario 10;6: samples containing in lower bound maximum 10 µg/kg aflatoxin total but aflatoxin B1 not higher than 6 µg/kg;

<sup>(c)</sup>: Lower bound: results below the limit of detection or limit of quantification were replaced by zero;

<sup>(d)</sup>: Upper bound: results below the limit of detection or limit of quantification were replaced by the value of the limit of detection or limit of quantification;

3. Consumption data

Information on consumption of dried figs was available from the EFSA Comprehensive European Food Consumption Database for 8 Member States (Belgium, France, Germany, Hungary, Ireland, Italy, Sweden and the United Kingdom) (EFSA, 2011). Average daily consumption of dried figs in the adult population varied among the 8 Member States from 0.04 g/person to 0.19 g/person. In children, only one or two subjects per dietary survey reported consumption of dried figs indicating a lower preference of children for dried figs consumption compared to adults. A second source of information for consumption of dried figs was represented by the GEMS/Food Consumption Cluster Diets database where EU Member States were grouped in diet clusters (FAO/WHO, 2006). According to this, the average daily consumption of dried figs varies from 0.2 g per person in clusters E and F to 0.6 g per person in cluster B.

4. Exposure assessment

For the assessment of exposure resulting from consumption of dried figs, the consumption as provided in the GEMS/Food database was used. The reason for this choice was that the indicated consumption of dried figs in the GEMS/Food database was higher compared to the one provided in the EFSA Comprehensive database, thus ensuring a more conservative assessment. In addition, this is in line
with the approaches applied in the EFSA Scientific Opinions in 2007 (EFSA, 2007) where food consumption from GEMS/Food were used to estimate the total dietary exposure to aflatoxins which will be referred to in the present assessment.

The potential increase in aflatoxin exposure by changing the maximum levels for aflatoxins in dried figs was estimated by calculating the difference in the dietary exposure between the assumed current situation (Scenario 4;2) and the possible future situation after changing the maximum levels (Scenario 10;6) as detailed in section 2. Although the mean concentrations were calculated for both lower bound and upper bound, the assessment was based on the upper bound estimates which are more protective for the consumers. Therefore, mean concentrations calculated in upper bound were combined with the consumption of dried figs as available from the GEMS/Food database. The estimated contribution of dried figs to the total dietary exposure to aflatoxins and the potential increase in exposure by changing the maximum levels are presented in Table 3. The contribution of dried figs to the total exposure to aflatoxins under the current maximum levels was estimated at 0.5 % to 0.8 % across the three diet clusters. By increasing the maximum levels for aflatoxin total to 10 µg/kg (combined with a maximum of 6 µg/kg for aflatoxin B1) the contribution of dried figs would represent 0.6 % to 1.0 %. The increase in the total dietary exposure to aflatoxins would represent 0.15 % to 0.26 % with the highest total exposure and the highest increase in the dietary cluster B.

Table 3: Estimated exposure to total aflatoxin in adult population (ng/kg body weight per day) assuming a body weight of 60 kg at the current maximum levels (Scenario 4;2) and the proposed maximum levels (Scenario 10;6) for dried figs.

<table>
<thead>
<tr>
<th>Maximum level</th>
<th>Mean concentration of total aflatoxins in upper bound (µg/kg)</th>
<th>Consumption g/day per person</th>
<th>Cluster B</th>
<th>Cluster E</th>
<th>Cluster F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried figs</td>
<td></td>
<td></td>
<td>0.6</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Scenario 4;2</td>
<td>1.58</td>
<td>0.0158</td>
<td>0.0053</td>
<td>0.0053</td>
<td></td>
</tr>
<tr>
<td>Scenario 10;6</td>
<td>2.08</td>
<td>0.0208</td>
<td>0.0069</td>
<td>0.0069</td>
<td></td>
</tr>
<tr>
<td>Total dietary exposure&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.934</td>
<td>1.097</td>
<td>0.687</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure from other foods&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.918</td>
<td>1.092</td>
<td>0.682</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total other foods + Contribution of dried figs in scenario 10;6</td>
<td>1.939</td>
<td>1.099</td>
<td>0.689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in total dietary exposure</td>
<td>0.26 %</td>
<td>0.15 %</td>
<td>0.23 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>: Total dietary exposure in adult population as estimated in the EFSA 2007 assessment (EFSA, 2007);
<sup>b</sup>: Exposure from other foods as calculated by subtracting the contribution of dried figs from the total exposure;

CONCLUSIONS

An increase of the maximum level for aflatoxin total in dried figs from 4 µg/kg to 10 µg/kg would most likely result in an increase of the total aflatoxin exposure in adult population by 0.15 % to 0.26 %. Such an increase can be considered marginal in comparison to the total aflatoxin exposure from all dietary sources.

RECOMMENDATIONS

The recommendations of the CONTAM Panel expressed in the 2007 and 2009 Scientific Opinions should be considered in applying risk management decisions on aflatoxins in food.
REFERENCES

EFSA (European Food Safety Authority), 2007. Opinion of the Scientific Panel on Contaminants in the Food chain on a request from the European Commission related to the potential increase of consumer health risk by a possible of the existing maximum levels for aflatoxins in almonds, hazelnuts and pistachios and derived products. The EFSA Journal 446, 1-127.

EFSA (European Food Safety Authority), 2009. Statement of the Scientific Panel on Contaminants in the Food Chain on a request from the European Commission on the effects on public health of an increase of the levels for aflatoxin total from 4 μg/kg to 10 μg/kg for tree nuts other than almonds, hazelnuts and pistachios. The EFSA Journal 1168, 1-11.
