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SCIENTIFIC COMMITTEE ON FOOD

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Opinion on

Dioxins in milk derived from cattle fed on contaminated feed in Belgium

(expressed on 16 June 1999)

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Terms of reference

1. The Committee was asked to advise the Commission whether, on the basis of consumer health considerations, there are grounds to treat milk and dairy products (with the exception of butter) differently from the other products specified in Article 1 (1.A) of Commission decision 1999/368/EC.

In making its assessment, the Committee was asked:

- To comment on the scientific validity of the arguments made in the report of the ad hoc scientific committee advising the Belgian authorities (06-06-99)

- To evaluate the claim that the dilution of contaminated milk by uncontaminated milk during commercial pooling reduces dioxin to background levels which are currently found in such products

- To take account of any other information it considers pertinent

2. To advise the Commission whether the available risk assessments for dioxins, furans and PCBs are, in general terms, adequate to provide a basis for risk management in this area and whether further work needs to be done.

Background

Polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), often referred to as “dioxins”, and polychlorinated biphenyls (PCBs) are persistent environmental contaminants that due to their high fat solubility and resistance toward metabolic degradation accumulate in the food chains. They are therefore ubiquitously present at background levels in fat tissue of mammals, including domestic animals and humans. The dioxins and dioxin-like PCBs have a high order of toxicity. They are present as complex mixtures in food and human tissues. They are thought to exert their toxicity via a common mode of action and methods have been developed to express the total toxicity of such mixtures as the so called toxic equivalency concentration (TEQ). Two methods are currently used. One method calculates I-TEQs, which only account for PCDDs and PCDFs, while the more recent WHO-TEQ includes also dioxin-like PCBs.

In its deliberations, the Committee noted that the Tolerable Daily Intake for dioxins includes PCDDs, PCDFs and dioxin-like co-planar PCBs.

In February 1999 chicken breeders and egg producers in Belgium began to observe that their poultry showed signs of intoxication (neurological symptoms), had poor reproductive performance and produced eggs having thin shells. Complaints were addressed to their deliverers of feed. One of the producers of animal feed informed the authorities in March about the apparent problem. The producer had one sample of feed and one sample of poultry fat analysed for dioxins in mid-March. The results showed 781 pg I-TEQ/g feed and 958 pg I-TEQ/g chicken fat. These results were communicated to the Belgian authorities in late April. Nine suppliers of animal feed were traced which all had used the same fat in the production of the animal feed. The fat was purchased from one single producer. From their investigation the Belgian authorities has concluded that the contaminated fat originated from one production tank containing about 80 tonnes produced and sold between January 16th and 31st (no dioxins were found in feed containing fat from the other production tanks as well as fats produced at earlier and later dates). At a later stage the presence of high PCB concentration, and the profile of PCBs, PCDDs and PCDFs suggested that the contamination was due to a commercial PCB preparation.

The Belgian authorities informed the European Commission on May 28th. On June 3rd 1999 the European Commission issued decision 1999/363/EC on safeguard measures towards animal products (poultry including turkey and eggs) for consumption or feed, contaminated with dioxins. Following further information from the Belgian authorities that some part of the feed might also have entered into the production of pork, beef and milk, the Commission on June 4th issued decision 1999/368/EC on safeguard measures towards dioxin contaminated products for consumption, based on pork and beef, including milk and milk products.

The Belgian authorities have contested the inclusion of milk and milk products (with the exception of butter), arguing that such products do not pose a risk to consumer health. The position of the Belgian authorities is based on a report drawn up by an ad hoc scientific committee (dated Sunday, 06-06-99) and an argument that the commercial procedures for the collection and pooling of milk from dairy cattle will, by its nature, ensure that milk contaminated with dioxins is diluted by non-contaminated milk to a level which is of no health significance.

Introduction

The Committee took note of the report of the Belgian ad hoc scientific committee. It also received a presentation from the Belgian authorities giving full details of the available analytical data on PCBs and dioxins in Belgian dairy products.

The Committee recognised the serious efforts made by the Belgian authorities in tracing the source of contamination and taking action to determine the scale of the problem. However, the Committee considered that the information currently available was inadequate for the purpose of making an assessment of the safety of milk and milk products consequent to contamination of the feed of dairy cattle with mixtures of PCBs containing dioxins. In particular, the following points were considered to be required or desirable for an evaluation of the safety and are discussed in more detail below:

- Whether the levels of 7 persistent PCBs in milk could be used reliably as a surrogate for dioxins and what is the appropriate ratio PCBs:dioxins applicable to milk and dairy products;

- Data on PCB levels in individual farm samples associated with the contamination;

- Confirmation that the levels of PCBs and dioxins in milk from contaminated herds is decreasing and at what rate.

Opinion of the Scientific Committee on Food

Question 1

The Committee draws its conclusions on the basis of the very specific nature of the current dioxin and PCB contamination pattern in Belgium. It stresses that its conclusions cannot be extrapolated to other contamination events involving PCBs and dioxins.

The Committee accepts that the results of the currently available analysis of animal feed, poultry and eggs show a profile of PCBs, PCDDs and PCDFs consistent with a commercial PCB preparation. The congener composition of the PCBs resembled a mixture of commercial PCBs, such as Aroclors 1254 and 1260, and the composition of PCDDs and PCDFs had predominance of PCDFs in the samples. The presence of other contaminants cannot be entirely excluded.

The Committee also accepts that it should be possible to establish a reliable correlation between PCBs and dioxins in contaminated samples that would be characteristic for this particular contamination episode. The idea is that on the basis of an analysis of the PCB content (7 specific PCB congeners, IUPAC Identifier: PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180) in a given sample it will be possible with adequate confidence to predict the content of dioxins expressed as TEQs. Based on the available analyses, such a relationship can been established for contaminated poultry and egg. Thus, a ratio of 50,000 was established between the PCB and the dioxin TEQ content for poultry and eggs, reflecting this particular contamination episode. Although this correlation between PCBs and dioxins is based on results from samples having PCB concentrations of 1000 ng/g fat or higher it is the opinion of the Committee that this relation may be used to predict dioxin TEQ concentrations in poultry and egg at PCB concentrations below 1000 ng/g fat, although this assumption is only based on a few samples. The Committee noted, on the basis of a few analyses on highly contaminated eggs that in these samples dioxin-like PCBs amounted to approximately 80% of the total TEQ content.

For milk and dairy products it is not possible with confidence to establish the same correlation between PCBs and dioxins originating from this contamination episode. No data on milk samples taken at individual farms were available. All milk samples were taken at a later stage in the processing, either from collection tanks, at dairies or at the retail level. The majority of the available analyses of milk and milk products showed PCB and dioxin levels that are at or below the limit of quantification for the laboratories performing the analyses, and thus no ratio can be established. In this context the Committee noted that the limits of detection for PCBs in milk reported were considerably higher than would have been expected, had the analyses been performed by

laboratories experienced in the analysis of PCBs in foodstuffs. However, a few analyses of milk samples had been performed using an adequate limit of detection and showed PCB and dioxins at levels considered as background levels for Belgium, which corresponds to a range of 10 - 40 ng/g fat for PCBs (seven congeners) and less than 2 pg/g fat for dioxin TEQs. In these samples the ratio between PCB (seven congeners) and dioxin TEQ concentrations were between 10,000 and 20,000. These levels and the PCB/dioxin ratio are similar to those seen at the background levels in Germany and the UK.

Another reason that the PCB/dioxin ratio established for this contamination episode in poultry and eggs from a scientific point of view cannot be uncritically transferred to milk and milk products is that the patterns of uptake, distribution, biotransformation and elimination of PCBs, PCDDs and PCDFs is expected to be very different in cows and poultry.

The Committee agrees that the dilution of contaminated milk by uncontaminated milk during commercial processing might reduce dioxin levels to background levels that are currently found in such products.

However, it wishes to stress its view, shared by other international expert groups that have been involved in the risk assessment of these compounds, that every effort should be taken to lower human exposure to dioxins and PCBs, and that the most efficient way to do so is to prevent wherever possible entry of PCBs and dioxins in to the food chain.

According to the Belgian authorities contaminated feed for cattle was delivered to approximately 390 farms. So far, the dioxin and PCB levels of the feed, the total amount of contaminated feed as well as the duration of feeding these products to cattle is not exactly known. All estimations performed by the Belgium authorities with respect to a possible contamination of dairy products are based on an even distribution of the contaminated feed to the farms in question and dioxin/PCB results from a limited number of samples collected in dairies. In contrast, results from milk collected directly at the farms, which received the contaminated feed, were not available to the Committee.

Assuming a “peak contamination” of cow’s milk in January/February 1999, it can be anticipated that the dioxin/PCB levels in the milk of the respective herds are presumably decreasing. However, this hypothesis can only be clearly confirmed by analyses of milk for dioxins and/or PCBs. Therefore, the Committee stresses the urgent need to analyse milk samples from all dairy farms in question, individually, at least for PCBs, using an adequate limit of quantification, as an indicator for a possible dioxin contamination above background. This can be performed within a very short period of time taking into account the momentary capacity for PCB analyses in Belgium.

In order to minimise dioxin exposure for this particular contamination episode identified in Belgium, the Committee proposes that an action level of 100 ng PCB(7 congeners)/g fat be used. This is a factor of 2.5 – 10 above the background level of PCBs in milk. This action level should be applied for screening purposes for raw milk from the individual farms in question, for bulked milk from dairies, and for any milk products manufactured since the date of known contamination of animal feed. Where levels above 100 ng PCB/g fat are found, this should trigger analysis of dioxins to establish whether further action needs to be taken. If contaminated samples are identified the

PCB and dioxin content will be established at which point the ratio between dioxins and PCBs in milk and milk products applying to this incident will become apparent.

The Committee stresses that this action level is only intended for PCBs in this particular situation in Belgium and should not be taken as an endorsement of a permanent limit for dioxins and PCBs in milk. The Committee is of the opinion that it would be possible to establish permanent limits for dioxins and PCBs in foods that take into account long-term exposures of the population. However, this would require a careful assessment that cannot be performed within the time frame of this particular contamination episode, and would most probably result in the establishment of limits that are lower than the above suggested action limit intended for the current situation.

Question 2

The most recent, international, risk assessment on dioxins has been carried out by a WHO-consultation group in 1998, which agreed on a tolerable daily intake (TDI) range of 1 to 4 pg TEQ/kg bw. This TDI includes PCDDs, PCDFs, and dioxin-like PCBs, based on their common mode of action and toxicity profile.

The Committee is of the opinion, based on the summary of the above consultation (ref) and on ongoing discussions within the scientific community, that the TDI is, in general terms, adequate to provide a basis for risk management in this area.

However, before adopting the WHO's value, the Committee wishes to revisit the WHO evaluation, in conjunction with the background documents which are expected to be published soon. Special attention will be given at that time to whether a weekly rather than a daily tolerable intake should be considered, given the cumulative nature of the substances and the extrapolation from the LOAELs for the most sensitive endpoints in animal experiments, via body burden comparison between animals and humans, and the use of an assessment factor of 10, to the TDI range of 1-4 pg TEQ/kg bw.

Furthermore, the Committee recommends that more information should become available with respect to the background levels of dioxins in food,, as well as to its incidental sources. The Committee is aware that recently a project of scientific co-operation within the EU Member States has started, in which existing information on the occurrence in food is gathered.

For non-dioxin-like PCBs no recent, international risk assessment has become available. A TDI of 1000 ng/kg bw for PCBs was derived by WHO in 1976. Although this TDI in the light of more recent information may be too high, the Committee is of the opinion that, given the continuing decrease of PCB levels due to environmental regulations in the past, a full risk assessment of non dioxin-like PCBs should not be given priority.

Surveys carried out in several countries, both on specific food commodities and on food intake, show a consistent pattern of diminishing amounts of PCBs over the years.