Maisons-Alfort, 22 August 2006

OPINION

of the French Food Safety Agency (Afssa) the current state of knowledge of the treatments used on wood materials in contact with wine and alcoholic beverages Recommendations and prospects for a risk assessment

On 13 November 2003, the Agence française de sécurité sanitaire (Afssa) [French Food Safety Agency] decided to carry out a review of the current state of knowledge of the treatments used on wood materials in contact with wine and alcoholic beverages.

Following an expert evaluation by an *ad hoc* review group and validation of its report by the Specialist Expert Committee on "Food Contact Materials " on 5 April 2006, Afssa has issued the following opinion, with the report attached in annex.

Context

A wide variety of woods are used as containers and materials which come into direct contact with a large number of foodstuffs (wines and spirits, cheese, fruit and vegetables, meat, poultry) or are used as cooking utensils. The maturation and storage of wine in oak barrels is one very common usage.

For some years now, the use of **oak chips** has been increasing outside Europe. In 2001, OENO resolution 9/2001 from the Organisation Internationale de la Vigne et du Vin (OIV) [International Organisation of Vine and Wine] accepted the use of oak pieces (or chips) in the production of wine. France has permitted the use of wood chips in table wine (for experimental purposes) since 1996, but is the only country in Europe to do so. However, their use is in the process of being authorised at European level (Council Regulation (EC) No. 2165/2005 of 20 December 2005 amending Regulation (EC) No. 1493/1999 and Regulation No.1622/2000).

The framework regulation on materials in contact with foodstuffs (Council Regulation (EC) No.1935/2004) states that "materials and articles, including active and intelligent materials and articles, shall be manufactured in compliance with good manufacturing practice so that, under normal or foreseeable conditions of use **they do not transfer their constituents to food in quantities which could endanger human health**, bring about an unacceptable change in the composition of the food or bring about a deterioration in the organoleptic characteristics thereof." Wood is included in the list of groups of materials and articles which may be covered by specific measures, however, to date no measures are available. The specific "wood" regulation applied in France is therefore the one dated 15 November 1945.

Finally, these woods, barrels and chips undergo **treatments, mainly heat based,** which can result in the formation of undesirable substances likely to migrate into the wine or spirits.

Objectives

The main objective of this study was to make sure that the molecules transferred by wood pose no health risk to the consumer. Consequently, the Afssa Specialist Expert Committee on "Food Contact Materials" examined the data available on the suitability of wood as a material in contact with wines and spirits.
As well as the molecules naturally extractible from wood, this study looked at the molecules produced by the processes designed to modify aromatic characteristics and/or to accelerate molecular exchanges.

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Principal conclusions

Despite the widespread use of wood for ageing spirits, and the differences in their specificities as compared with wine, most recent scientific data are concerned with wine.

In the literature analysed, molecules which had little effect in organoleptic terms, due to their insipidity, but were sometime found at considerable levels, were not studied either from a physico-chemical standpoint (migration) or a toxicological standpoint. Moreover, in most of the wood characterisation studies, the only data available concerned qualitative analyses of the potential migrants into wine or an alcohol simulant. There were no exploitable quantitative data.

The literature analysed showed that molecules produced both from the wood and by its heat treatment are found in wine. The lack of knowledge of the neoformed substances and their formation kinetics in terms of the heat treatment conditions must be emphasised insofar as the technological context of the process generates such substances. In that respect, a distinction must be made between the neoformed compounds sought for their technological properties and those not yet characterised. Very little is known about the effect of heat treatment is and the documents available do not permit the assumption that process control is in place as regards molecules likely to affect health. Consequently, the health risk appears insufficiently well-characterised.

In terms of wood chips, behaviour differing from that of a conventional cask is demonstrated in the literature. In fact, the use of chips accelerates migration and results in the very rapid extraction (in a few days) of almost all of the molecules capable of being released by the wood. The specific surface, related to the size of the chips, structural degradation and massive extraction of compounds from the wood require a guarantee of the absence of consequences for health. Furthermore, there is no mention in the literature analysed of the formation of compounds as a result of the chips being heated.

Recommendations

On the basis of this analysis, Afssa is making the following recommendations:

1. Checks on the raw material and process control

A check on any wood (origin, species and quality) and on its traceability is required when using it in the form of barrels or chips.

For barrels, a supplement to the guide to good manufacturing practice for traditional French casks including a section on "the migration of compounds present in wood on contact with wine" would be desirable, targeting in particular the compounds associated with wood treatments (cf. Para. 3). For chips, a guide to good manufacturing practice for chips should be produced, also including this section. Means of controlling heating (process instrumentation) need to be put in place.

2. Natural migrants from oak

Afssa recommends that in the short term qualitative and quantitative analyses are performed, as exhaustive as possible, of the compounds released by oak (barrels and chips) in order to characterise the health risk (or the absence of risk) from the use of wood, in addition to the technological and organoleptic aspects.

3. Migrants associated with the treatment of oak (barrels and chips)

Anti-fungal treatments

To control all risk from anti-fungal treatments (pentachlorophenol, *etc.*), checks before use are recommended. These may be based on the systematic measurement of levels of these substances in wood intended to come into contact with wine and alcoholic beverages (based on an order to be determined). Acceptability limits should be defined based in particular on the toxicology of these substances. According to the information Afssa has available, the Organisation Internationale de la Vigne et du Vin and the Fédération Française de Tonnellerie [French Federation of Coopers] are working in this direction. Batches of wood contaminated with banned substances or substances known to be toxic should be eliminated from wine industry use.

Heat treatments for wood

Scales for the maximum levels of heat treatment (time/temperature pairs; maximum temperature, *etc.*) should be defined based on analysis of the impact of these levels on the formation of neoformed compounds.

Heating techniques should be assessed and validated in terms of the potential formation of neoformed compounds. Maximum levels of potentially toxic compounds such as Polycyclic Aromatic Hydrocarbons (PAH) or dioxins must be defined for treated woods.

4. Wood pieces or chips

The studies recommended in Paras. 2 and 3 must take account of the specificities of wood chips, notably their size and structure.

Particular attention must be paid to the use of wood chips in terms of the expected technological function (flavouring) and heat treatments, notably heating to a high temperature (lack of knowledge of the heat treatments used, type and levels of substances in the treated wood, extraction kinetics of the compounds).

It is essential that there is a guarantee, prior to any use of these products, that the process of adding flavour by soaking wood chips is suitable for food contact purposes, if necessary through a specific authorisation application.

5. Spirits

Characterisation of the specificities (conditions of contact with and treatment of wood, wood handling) is essential for the different types of spirits, together with a definition of the measures taken to ensure these practices are suitable for materials intended for contact with food.

6. Assessing the risk

Afssa recommends the conduct of a precise assessment of the risks from the use of wood chips and intensive heat treatments of wood.

It is important that manufacturing practices for barrels and chips are clearly defined. In particular, a distinction must be made between traditional and other, more recent practices using new technology (wood species other than oak, the use of adhesive, chips).
Using analytical and toxicological studies, a risk assessment could be conducted in three stages:

- a complete and exhaustive chemical characterisation of substances extracted or migrating from wood to wine and spirits,
- a study of the products formed in wood at a range of temperatures,
- based on the above results, a toxicological assessment.

Finally, Afssa hopes that all the trade organisations involved will work with the health authorities to contribute additional data, in order to complete the risk assessment and enable a decision to be made as to the potential risks from the use of wood chips and treated wood.

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