Red Arrow®
Natural flavor, pure and simple.™

Health and Wellness Impact of Condensed Natural Smoke™

Using wood smoke to preserve meat, poultry, and seafood products has been in existence since prehistoric days. Traditional methods of smoking foods provide many benefits (flavor, color, antioxidant, antimicrobial) but they also carry some "baggage".

Because Condensed Natural Smoke™ is produced from smoke that is subjected to fractionation and purification processes where the tars containing the polycyclic aromatic hydrocarbons (PAHs) are removed, use of Condensed Natural Smoke™ provides the safest pathway for applying smoke to foods. This is due to the fact that some PAHs are generally known to be carcinogenic.

Besides reducing the levels of PAHs, other health benefits of Condensed Natural Smoke™ include the following:

1. Various smoke flavor compound fractions in Condensed Natural Smoke™ **provide antimicrobial properties**: with the phenols Isoeugenol, 4-Methylguaicol, and Guaicol providing significant impact against Listeria, Staphylcocci, Bacillus, and Yeasts [5, 6, 7]. Smoke flavor compounds inhibit the growth of bacteria by a prolongation of the lag phase proportionally to the smoke flavor compound content in the products[8].

2. The acid component of Condensed Natural Smoke™ also provides **antimicrobial activity**.

3. The smoke flavor compound components of Condensed Natural Smoke™ provide antioxidant activity which contributes to consumer health.
    a. Protecting product nutrients from oxidative degradation.
    b. Suppressing production of potentially toxic oxidation products.
    c. Preserving the nutritional (protein) product against spoilage and oxidation.

4. Switching from traditional smoking processes to use of Condensed Natural Smoke™ provides a **safer working environment**.
    a. Eliminating smoke clouds in the plant.
    b. Eliminating fire hazards (smoke generator and associated duct work).
    c. Significant reduction in caustic cleaners is needed when cleaning a smokehouse as compared to what is needed when using traditional smoke.

Traditional smoking processes contribute substantially higher and much more variable levels of PAHs to smoked meats as compared to the use of Condensed Natural Smoke™. Many factors influence the yield of PAHs in traditionally smoked product including generator/smoking temperature, smoke duration, generator type, and wood source. There is a tendency for an increased concentration of benzo(a)pyrene (BaP) with traditional smoke while Condensed Natural Smoke™ yield nominal levels with less variability as compared to other smoke generation types[3]: See table one.

PAHs represent a large class of compounds containing two or more fused aromatic rings made of carbon and hydrogen atoms. Hundreds of types of PAHs can be formed and released during incomplete combustion or pyrolysis of organic matter/fossil fuels – processes common to industrial processes, combustion engines, power plants, and other human activities[2].

Table 1: The influence of smoke generation method on BaP concentrations (µg/kg) - EFSA, 2008 [(3)] .

Smoke Generation	N	Median	Mean	Maximum
Burning of sawdust	411	0.05	0.20	3.50
Burning of wood chips	55	0.10	0.47	5.90
Friction of wood	13	0.08	0.16	0.40
Overheated steam	6	---	2.61	14.10
Condensed Natural Smoke	**9**	**0.03**	**0.06**	**0.30**

Foods can be contaminated with PAHs formed during drying, smoking, and cooking. Smoked and grilled foods may contribute significantly to the intake of PAHs if such foods are a large part of the diet. In the United States., smoked foods are second to the highest PAHs contributor group which is the bread, cereal, and grain group. Generally, the major contributors to PAHs intake in the average diet are oils and fats and cereals[3].

Many of the PAHs possess toxicological effects such as reproductive and developmental toxicity, and immunotoxicity. It is the carcinogenic and genotoxicity properties of these compounds that have stimulated further analysis and regulation of foods smoked with both traditional and Condensed Natural Smoke™. The European Union (EU) Scientific Committee on Food (SCF) has identified 15 PAHs that show clear evidence of mutagenicity/genotoxicity in somatic cells in experimental animals with 13 of these being carcinogenic and genotoxic[3]. The most studied of the genotoxic carcinogens is BaP (3,4 benzo(a)pyrene). The SCF has concluded that BaP may be used as a marker of occurrence and effect of carcinogenic PAHs in food. However, as other PAHs may predominate, the European Food Safety Authority (EFSA) has concluded that the suitability of maintaining BaP as the PAHs "marker" needs to be carefully assessed[3].

"Because smoke flavourings are produced from smoke which is subjected to fractionation and purification processes, their use is generally considered to be of less health concern than the traditional smoking process[4]."

The maximum (EU) level for BaP can be found in the EC Reg. #1881/2006;[4])

References:

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4. EFSA. 2008. Legislation. The EFSA Journal 724: 1-114
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