

冷库保温材料失火导致冻肉污染处理方法的研究

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摘要 报导了一起冷库保温材料失火导致冻肉污染的事故。提出了氰化物、3,4-苯并(α)芘、邻苯二甲酸酯类为主要污染指标。分析了水漂洗法造成二次渗透污染的可能性。提出了机械修割后反复漂洗等处理措施。认为以20%—30%的比例将精修后的冻肉按特定工艺条件投料使用是安全的。

关键词 食品污染 冷库处理

我市某单位3000t冷库于1993年不慎失火,库内1000余吨冷冻畜禽原料肉受到不同程度的化学烟尘污染。

1 现场卫生学调查

1993年12月15日上午,某单位在施工过程中电焊火花不慎落入冷库夹墙内,立即引起保温层聚氨酯等材料燃烧,酿成火灾。整个冷库烟雾弥漫,库存1000余吨冷冻畜、禽肉受到不同程度的化学性污染,尤以存放在顶层及四周的冻肉污染严重,呈碳黑色,黑色表层往里渗透约1~3mm,有明显的化学性烟尘刺激气味,冷冻状态良好。内、外包装未破损者冻肉表层未见黑色。火灾时冷库断电,制冷停止。消防用水为自来水,未添加任何化学物质。

为了控制污染,尽量减少损失,立即采取了以下措施:

将污染肉快速出库,远离污染源,加强机械通风,散发化学烟气。

废弃重度污染肉及已解冻的肉。

对中、轻度污染肉,彻底修割黑色部分,更换包装后分别入4个专用冷库中封

存。修割工序为去外包装→去内包装→粗修→精修→装编织袋→入库封存。

上述工序各环节固定专人,以防交叉污染,并由专职卫检员定岗监督。

2 确定污染物

冷库外墙结构依次为外墙—毛墙—二毡三油—聚氨酯硬泡。二毡三油即由10[#]沥青涂于二层油毛毡前后面构成,起防水作用。聚氨酯喷涂在沥青上成硬泡塑料,起保温作用。聚氨酯由异氰酸酯和多元醇组合聚醚构成。聚氨酯类泡沫塑料及油毡沥青等在厌氧条件不完全燃烧形成高碳烟尘。肉类厌氧燃烧,由于高温热聚生成多种氮氧化合物及多环芳烃,成分极其复杂。从阳性模拟燃烧实验的红外结果来看,成分约有数十种,其中对食品造成污染的主要化学物质为氰化物、3,4-苯并(α)芘以及邻苯二甲酸酯类。

3 毒理试验

实验动物由河北医大动物中心提供昆明种小白鼠140只,雌雄各半。样品均为重度污染肉,做急性毒性、蓄积毒性及骨

髓细胞微核试验，结果为阴性。

4 理化检验

取冷冻状态良好的中度污染肉为检样，分别取其表层（离表面<0.5cm），污染层（离表面<1cm），切割后样（离表

面>1cm）进行测试，并设阴性对照。

氰化物测定按异烟酸—吡唑酮分光光度法，〔4〕3,4-苯并（a）芘测定采用荧光光度法；〔5〕邻苯二甲酸酯类用气相色谱法测定。〔6〕结果见表1。

表1 污染冻肉分层检验结果

样品	距表面距离 cm	氰化物 μg/g	3,4-苯并（a）芘 μg/kg	邻苯二甲酸酯类 %	感 观
黑色表层	<0.5	1.40	47.75-83.18	0.122	炭黑色，烟熏味
污染层	<1.0	0.27	<1.00	0.017	少许黑色，轻度烟熏味
切割后	>1.0	未检出	<1.00	0.010	无异味，正常肉色
空白样	—	未检出	<1.00	0.010	无异味，正常肉色

由表1可见，黑色表层不同程度受到3种化学污染物质污染，尤以氰化物、3,4-苯并（a）芘为重，但由表层向深部切割1cm以上弃去后，剩余部分基本为无污染状态，污染物残留量也由表向里依次降低至本底值。

5 处理方法

5.1 处理原则

由于本次污染冻肉量大，因此处理时要既保证消费者利益，又要符合国情；既要尊重数据，又不能唯数据。在我们取得毒理实验阴性结果基础上，按不同层次对污染物进行残留量监测，用物理切削法修割至基本无污染状态，再研制小试工艺并对试样进行检验。

5.2 小试工艺

将已修割后的冻肉，以库为单位分别取样，在冷冻条件下，由表向里修割1cm后弃去污染层，然后将肉块在流水中漂洗至解冻，按正常生产配料加工成小试样备检。

5.3 检验结果

4个库冻肉分别取样2份，按5.2工

艺条件加工成小试样共8份样品，感观性状良好，氰化物、邻苯二甲酸酯类均未检出，3,4-苯并（a）芘<0.5μg/kg，已达到无残留状态。

5.4 处理结论

经初步修割后的污染冻肉，在特定工艺条件下可以投入使用，即将原料肉表层向里切割1cm（不含黑色污染层），用流水反复漂洗后按20%~30%比例投料使用。处理时必须固定专人负责，加强监督，专线生产，专库存放，产品检测项目除按国标外，应增加污染指标监测。

6 讨论

由于氰化物有水溶性的特征，一旦冻肉解冻就可能向深部渗透污染，故在应急措施上，尽管难度较大也应在冷冻完好时进行彻底修割；有人认为可以用水冲洗的方法消除污染，此法固然可以除去部分未完全燃烧的黑色碳粒，但很可能加重氰化物的水溶性污染，因此笔者认为物理切削法优于水漂洗法。为控制刺激性烟气2次渗透污染，应加强冷库的机械排风。已解冻的肉品无论污染程度如何，均不应再考

虑其利用问题, 应予放弃。

由于烟气成分复杂, 故应首先进行毒理学评价, 再根据所确定的污染物进行残留量测定, 并设有阴性对照。

设计的小试工艺是将已修割的污染冻肉用流水反复冲洗, 以尽可能消除渗透到深层的水溶性污染物含量, 在各项指标完全合格的前提下, 肉品利用时又考虑了 5 倍的安全系数, 按 20% ~ 30% 比例投料使用。因此, 各批次产品无论感官、污染物指标及国标规定项目均达到标准, 可以认为是安全的。

(本文使用的数据由卫生部食品卫生监督检验所、化工部黎明院、北京市卫生防疫站、河南省食品卫生监督检验所、洛阳市

卫生防疫站等单位提供, 在此一并致谢。)

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第三次全国城市卫生检验团培训班在京举行

经国务院批准, 第三次全国城市卫生检验评比活动将于今年八月至十月进行。全国爱卫会组织九个检查团检查全国直辖市、省会城市和计划单列市在内的 35 个城市。为了统一思想、统一认识, 熟悉掌握检查标准、方法, 明确检查工作纪律, 团结协作, 密切配合, 全国爱卫办于 8 月 26 日 ~ 27 日在北京市昌平区中国农村改水技术中心举办全国检查团培训班。

全国爱卫会主任彭佩云和副主任陈敏章出席了开幕式并做了重要讲话。彭佩云强调检查团和被检查城市必须坚持求实、务实原则, 反对弄虚作假、克服形式主义、做表面文章的不良现象。

陈敏章指出: 城市卫生检查评比活动是推动城市卫生工作不断深入的有效方法, 是在新的历史条件下, 爱国卫生工作的进一步深化和发展。此次检查一改过去抽签检查的方法为推荐和随机检查、明查和暗访相结合的方法, 以对被检城市作出客观的评价。

本次检查将开展食品卫生、公共场所、饮用水及传染病防治等方面的检查。

卫生部食品卫生监督检验所 高小蕾供稿

异味。实验室检查, 细菌学指标均合格, 此确认本次食物中毒为饮用锡超标的罐装
理化检验发现芒果汁中锡含量 285mg/kg, 芒果汁所致。
超过国家限定标准 ($< 200\text{mg/kg}$)。因

ABSTRACT

**State and management of adulterated foods/ Zhu Jianru Chen Yongde//
Chinese Journal of Food Hygiene. - 1995, 7(3): 1~5**

The investigation on preparation and distribution of adulterated foods indicated that adulterated foods are mainly due to abnormal psychology of consumption, evil mentality of producers, failure of macro-control over production field, local economic protection and group benefits, authorities' corruption, unfair trade, low level of consumers' self-protection. To clear up adulterated foods effectively, it must be based on deepening reform, establishing an equal-competitive environment, punishing adulterated food producers according to food hygiene law, educating food producer and handlers with relevant law and professional morality, circulating notices of the food adulteration cases, praising the units who efficiently clear up adulterated food, enhancing the consumers' ability on distinguishing adulterated foods.

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Key words food adulteration supervisor

Collection and analysis of the diagnostic evidences of the mass food poisoning / Jiang Jiakun// Chinese Journal of Food Hygiene. - 1995, 7(3): 5~11

The collection of evidences have to be done after the mass food poisoning has happened because of the random of the event. The food safety inspectors must do great efforts to get not only the direct proofs, but also the indirect ones as many as possible to make correct diagnosis by epidemiological techniques. The collection of the patient information and samples of suspicious foods, the methods of analysis and treatment in mass food poisoning were discussed.

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Key words food poisoning diagnostic program epidemiological investigation

Study on method of treating contaminated frozen meat due to the fire of thermal

insulation material of fridge/ Li Shengrong Feng Xueshun Li Yumin// Chinese Journal of Food Hygiene. - 1995, 7(3): 11~14

A case of contaminated frozen meat resulting from the fridge thermal insulation material catching fire is reported. Hydride, 3, 4-Benzo (a) pyrene and phthalic acid esters were identified as the main contaminants. It's possible for them to permeate the meat if the meat are washed by water. The treatments

such as mechanical cut followed by washing repeatedly were put forward. It was considered safe that the treated meat was put into use in proportion of 20% ~ 30% by specific process.

Author's address Li Shengrong, Luoyang municipal hygiene and Anti-epidemic Station Henan 471000, PRC

Key words food contamination frige treatment

The evaluation of food consumption structure and nutrition status in rural inhabitants in Suixi county / Liu Daoyun // Chinese Journal of Food Hygiene. - 1995, 7(3): 14~18

The investigation on food consumption structure in 1985~1990 in Suixi county and the diet survey in three villages in 1990 showed that along with the increase of agriculture production amount and the average expense in living and food, the food consumption structure was improved. However, the average amount of grain for each person decreased due to the increasing population. The average daily intake of calories is 11074kJ per person, of which 89.3% come from plants. The average daily intake of protein is 71g, of which 84.9% is plant origin. It only meet the basic need for energy, but the quantity and quality of protein is poor. It is necessary to improve crop-growing structure, develop animal husbandry, and increase soybeans production for the purpose of enhancing the nutrition level of people.

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Key words nutritive ratio food survey

Analysis of contaminated rice with combined GC-MS/ Zhang Ying Yang Dajin Fang Congrong et.al// Chinese Journal of Food Hygiene. - 1995, 7(3): 18~20

60t contaminated rice was found in a railway station of Inner Mongolia province on Jun. 3, 1994. Under the analysis with combined GC-MS, the contaminant was determined to be Terbufos, an imported organophorous pesticide which is forbidden to be used in China. The results showed that the use and transportation of some pesticides are out of control, and the great attention should be given to the prevention of food contamination in rail transportation.

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Key words terbufos grain contamination pesticide contamination analysis of pesticide combined GC-MS

A study on antioxidation effect and antimutagenicity of spice oleoresins/ Hong Dongxu Cui Hongbin Shao Lijun et.al// Chinese Journal of Food Hygiene. - 1995, 7(3): 21~23

16 spice oleoresins were extracted by Soxhlet extractor and their antioxidation effect were studied with linoleic acid bubble oxidizing method. Results indicated

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