BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Environmental Health Services

Food Issue

Notes from the Field

Review of pine mushroom applications for making (1) an oil extract, and (2) infused salt

Request received from:	Regional Health Authority
Date of request:	September 26, 2013
Issue (brief description):	Approval of HACCP plans for allowing a pine oil extract and pine oil infused salt

Disclaimer: The information provided in this document is based on the judgement of BCCDC's Environmental Health Services Food Safety Specialists and represents our knowledge at the time of the request.
It has not been peer-reviewed and is not comprehensive.

Summary of search information

1. Internet sources
2. Other – in house references.

Background information

The client requests permission to make and sell two products: one is an oil extract infused with pine mushrooms and the other is a salt infused with pine mushrooms. The mushrooms will be dehydrated and placed into either oil or salt. No recipes were provided, and no other ingredients are being added. The products will be made after hours in a permitted restaurant with the intent to sell in retail stores

What are the risks associated with pine mushrooms and infused oil and salt products?

The source of the mushrooms as an ingredient is difficult to assess. Pine mushrooms are harvested regularly in local BC forests. Persons who harvest pine mushrooms have no requirement for licensing or accreditation. The possibility that a poisonous mushroom is incorrectly harvested cannot be ruled out. Further, drying a mushroom effectively removes the ability to identify it properly.

Mushrooms as a food product, and products suspended in oil, are known to be potentially hazardous foods and have been associated with serious outbreaks of botulism in British Columbia in the past. In 1987, bottled chanterelle mushrooms were incorrectly prepared and held at room temperature in canning jars. This outbreak resulted in 11 Botulinum Type A illnesses.[1-3] In 1985, commercially dehydrated garlic was rehydrated in soybean oil, and again these products were held at room temperature at a restaurant chain. This resulted in 37 Botulinum Type B illnesses. [4,5] Following these BC outbreaks, similar issues with these products in US outbreaks led to new recommendations for the preparation and storage of these products.[6] These changes included a requirement for products such as mushrooms or herbs in oil to be challenged with at least two food preservative conditions, such as

refrigeration, product acidification, or inclusion of a product preservative, such as salt.[6-8] This approach to food preservation and safety is more commonly known as applying multiple hurdles to the food.[9]

Dehydrated mushrooms, if they are ***not*** stored in oil, can be used in food products. A safe water activity level for wild mushrooms has been cited as 0.6.[10] Lower water activities will further preserve the product from browning and other enzymatic deterioration - this water activity value is cited as 0.4.[10]

Salting of foods is one of the oldest methods of preservation. Although salting alone will not necessarily stop growth of microorganisms at concentrations under 10% in brine solutions, placing dehydrated mushrooms in salt should neither allow growth of microorganisms nor elaboration of toxin.[11]

Previous guidance on wild mushroom vending from British Columbia

A legal opinion was sought by one Regional Health Authority in 2002 on what oversight they should have for the activities of harvesting and selling wild mushrooms, and for informing the public of the potential hazards associated with this activity. The substance of this e-mail is shown below:

> This is the opinion you requested on the application to a wild mushroom picker's premises of section 11 of the Food Premises Regulation under the Health Act, as follows:
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> 11. Every operator of food premises must ensure that all food on the premises is obtained from
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> (a) food premises for which plans and specifications have been approved under section 3, or
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> (b) a source that is approved by the government of Canada, the government of another province or territory, or an official or agency of any of those governments under whose authority food safety standards are established and enforced.
>
> With respect to clause (b), CFIA has informed you that there are no government of Canada regulations respecting the safety or quality of wild mushrooms and therefore no procedures in place to provide "approvals" of the "source" of wild mushrooms that the pickers sell to wholesalers, food retailers or restaurants. Consequently, it is impossible for the VIHA to monitor clause (b).
>
> In fact, the Food and Drug Act (Canada) contains the following:
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> 4. No person shall sell an article of food that
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> (a) has in or on it any poisonous or harmful substance;
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> (b) is unfit for human consumption;
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> (c) consists in whole or in part of any filthy, putrid, disgusting, rotten, decomposed or diseased animal or vegetable substance;
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> (d) is adulterated; or
>
> (e) was manufactured, prepared, preserved, packaged or stored under unsanitary conditions.
>
> "food" includes any article manufactured, sold or represented for use as food or drink for human beings, chewing gum, and any ingredient that may be mixed with food for any purpose whatever;
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> Clearly, the government of Canada has taken on the legislative responsibility for regulating the quality of food sold in Canada, as is its constitutional right. The provinces do not have jurisdiction over this matter and therefore, neither do the regional health authorities in BC. That is why section 11 of the Food Premises Regulation contemplates source approval by the government of Canada or a government other than the government of BC.

All you can do, as a health authority, is examine and where appropriate approve or reject the plans and specifications for the food premises of the mushroom picker where the premises meet the following definition:

"food premises" means any place where food intended for public consumption is sold, offered for sale, supplied, handled, prepared, packaged, displayed, served, processed, stored, transported or dispensed.

Since the government of Canada, as the jurisdiction responsible for food safety, has not put standards or approving procedures in place for wild mushrooms, it is impossible for the operator of the wild mushroom food premises to obtain or be the subject of approval of the "source" of the food (the forest?). However, both the picker and all the subsequent links in the food chain leading to the consumer are bound by section 4 of the Food and Drug Act. They will be in violation of that Act if they sell poisonous or contaminated mushrooms.

The regional health authority cannot legislate standards for wild mushrooms, as its board does not have that power. Even if it did, it would have to hire experts, such as mycologists, to inspect the mushrooms so regulated. The responsibility of the health authority and its inspectors is to review the plans and specifications of the food premises and to carry out such further inspections of the premises after the approval as the Health Act and the Regulations require.

Therefore, you may inform the lawyer for the picker that it would be in order for them to submit their plans and specifications to you and that you will not be requiring proof of approval of the source since you have been advised by representatives of the government of Canada that there are no standards and no approval process for wild mushrooms.

You may wish to publish an alert directed to consumers, food wholesalers and retailers, as well as restaurateurs, that wild mushrooms are not regulated in Canada as to their quality and safety. The VIHA administers the regulations for the PREMISES where wild mushrooms are sold, offered for sale, supplied, handled, prepared, packaged, displayed, served, processed, stored, transported or dispensed, but has no jurisdiction over the quality of the mushrooms since that is a responsibility of the government of Canada.

The VIHA cannot offer any assurances to the public that wild mushrooms purchased in stores or eaten in restaurants by the public are safe to consume.

In 2012, BCCDC confirmed with Health Canada that they do not provide oversight to either licensing of wild mushroom harvesters or to subsequent sale or processing of wild mushrooms. Retailers would still be responsible for section 4 of the *Food and Drugs Act* (http://laws-lois.justice.gc.ca/eng/acts/F-27/page-2.html#h-5).

In 2007, another Regional Health Authority created a decision document addressing the sale of wild mushrooms at temporary markets. This was circulated to food safety managers in other health authorities, but no consensus was reached or communicated to this office. Below is the decision:

A vendor wishing to sell wild mushrooms at a temporary market should be warned of his liability, and of the legislative restrictions against the sale of toxic food products in the subjects section of the letter of "acceptance". Suggested wording: "Acceptance of wild mushrooms for sale is subject to the vendor's self-declaration of expertise and both the vendor's and market manager's recognition of the responsibility and liability involved. Sale of toxic mushrooms is a violation of the Sanitary Regulations and the Food and Drug Act." Any action taken against a vendor shall be complaint-driven.

At least one other Regional Health appears to have adopted this advice following a consultation request earlier in this calendar year (January 2013; personal communication).

Guidance from Health Canada, the Canadian Food Retail Code and elsewhere

No guidance could be found for wild mushrooms or products in oil in the Canadian Food Retail Code. On the Health Canada site, a consumer web-page advises home preparation of vegetables and herbs in oil be refrigerated for up to one week before discarding (http://healthycanadians.gc.ca/eating-nutrition/safety-salubrite/oil-huile-eng.php). In the United States, wild mushrooms are contained in the 2009 food code in section 3-201.16, which stipulates that harvesters must be approved by an expert or mushrooms must be sourced from a processing plant subject to inspection (see below) (http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm186451.htm#part3-5).

> **3-201.16 Wild Mushrooms.**
>
> 1. (A) Except as specified in ¶ (B) of this section, mushroom species picked in the wild shall be obtained from sources where each mushroom is individually inspected and found to be safe by an APPROVED mushroom identification expert. [P]
> 2. (B) *This section does not apply to:*
>   1. (1) *Cultivated wild mushroom species that are grown, harvested, and processed in an operation that is regulated by the FOOD regulatory agency that has jurisdiction over the operation; or*
>   2. (2) *Wild mushroom species if they are in packaged form and are the product of a FOOD PROCESSING PLANT that is regulated by the FOOD regulatory agency that has jurisdiction over the plant.*

In Australia, commercially prepared foods in oil are hot-packed and guidelines for vegetables in oil specify that for low-acid foods, addition of acetic acid is required.[12] A recent review of home preparations of products in oil in the US found educational documents prepared by "extension services" (contracted Universities who post consumer advise) advise between 3 days to 3 weeks storage of products, either refrigerated alone or with acidification.[13] Water activity alone as a barrier to botulinum toxin formation is not considered adequate as water droplets can form in oil.[13]

Recommendations from BCCDC

The HACCP plans submitted by the retailer for making these products do not consider biological, chemical or physical hazards. The tables construction appear to focus on the activity and good manufacturing practices associated with the activity. For example, washing of bottles/containers and cleaning/sanitizing of surfaces. The retailer clearly needs some assistance with understanding how the HACCP table should work. Providing a recipe, and creating a "food flow chart" may be a good first step towards understanding how that product is being made. Further consultations with the EHO or a food consultant may be advised.

In addition to the above BCCDC recommends the following:

- The retailer should be advised as to his/her responsibilities under the Food Premises Regulation and Food and Drugs Act that he/she is ultimately responsible should a poisonous or toxic mushroom cause a foodborne illness. Purchasing of pine mushrooms from an "approved" vendor in Canada is not possible, as no authority has jurisdiction over this product.

- The manufacture of dehydrated pine mushrooms in oil should not be permitted due to the risk of botulism (from bacteria Clostridium botulinum). The manufacture of this product should incorporate at least two microbial hurdles, such as acidification, refrigeration, addition of preservative, etc. and be re-evaluated for safety.
- The water activity of the dehydrated pine mushroom should be at or below 0.6.
- The manufacture of salt infused dehydrated pine mushroom appears acceptable, however, as described above, the HACCP table should be amended and a recipe and food flow chart created and provided before approval.
- BCCDC should recommend that the topic of wild mushroom harvesting and sale in farmers markets, or in other venues, be addressed by the food managers council in order that standardization across HA's can occur.

References

1. Leads from the MMWR. Restaurant-associated botulism from mushrooms bottled in-house--Vancouver, British Columbia, Canada. JAMA. 1987 Mar 20;257(11):1449.
2. Restaurant-associated botulism from mushrooms bottled in-house--Vancouver, British Columbia, Canada. MMWR Morb Mortal Wkly Rep. 1987 Feb 27;36(7):103.
3. McLean HE, Peck S, Blatherwick J, et al. Restaurant-associated botulism from in-house bottled mushrooms - British Columbia. Canada Diseases Weekly Report. 1987;13(8):35-6.
4. Update: international outbreak of restaurant-associated botulism--Vancouver, British Columbia, Canada. MMWR Morb Mortal Wkly Rep. 1985 Oct 18;34(41):643.
5. St Louis ME, Peck SH, Bowering D, et al. Botulism from chopped garlic: delayed recognition of a major outbreak. Ann Intern Med. 1988 Mar;108(3):363-8.
6. Dodds K. Restaurant-associated botulism outbreaks in North America. Food Control. 1990:139-41.
7. Loving AL. Botulism in flavored oils - a review. Dairy, Food and Environmental Sanitation. 1998;18(6):438-41.
8. Elliott PH, Schaffner DW. Germination, growth, and toxin production of nonproteolytic Clostridium botulinum as affected by multiple barriers. Journal of food science. 2001;66(4):575-9.
9. US Food and Drug Administration. Evaluation and Definition of Potentially Hazardous Foods - Chapter 3. Factors that Influence Microbial Growth. 2013 [cited 2013 Oct 8]; Available from: http://www.fda.gov/Food/FoodScienceResearch/SafePracticesforFoodProcesses/ucm094145.htm.
10. Argyropoulos D, Rainer A, Mueller J. Establishing moisture sorption isotherms of wild mushroom varieties using a dynamic vapor sorption method. XVIIth World Congress of the International Commission of Agricultural and Biosystems Engineering; June 13-17, 2010; Quebec City, Canada: CIGR XVIIth World Contress; 2010. p. 1-8.

11. Shapton DA, Shapton NF. Principles and Practices for the Safe Processing of Foods. Oxford, Great Britain: Sutterworth-Heinemann Ltd.; 1991.
12. NSW Food Authority. Shelf stable acid preserved foods. Factors affecting the shelf stability of acid foods, condiments, sauces and salad dressings. 2008 [cited 2013 Jan 4]; Available from: http://www.foodauthority.nsw.gov.au/science/risk-framework-and-studies/food-risk-studies/pickles-sauces-salsas/.
13. Nummer BA, Schaffner DW, Fraser AM, et al. Current food safety issues of home-prepared vegetables and herbs stored in oil. Food Protection Trends. 2011;31(6):336-42.