



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

Environmental Health Services

Food Issue

Notes from the Field

Raw carob or cocoa chocolate intended for sale at farmers' markets

Request received from:	Regional Health Authority
Date of request:	September 25, 2013
Issue (brief description):	Client wishes to produce a raw chocolate using carob or cocoa nuts, ground into powder and mixed with coconut butter for sale at farmers' markets

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 It has not been peer-reviewed and is not comprehensive.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, various. Also reviewed Outbreak Alert! databases and used Google scholar to search for articles of interest.
2. Ovid (define your search terms): CAB and FSTA abstracts using "carob gums OR carob beans OR carob pods" n=683 in combination with "food safety" n=115,964; "HACCP" n=3264; and "microorganisms OR standards OR processing OR food safety OR food safety plant foods OR food processing mp." n=180,723.
3. Other: FoodNetBase and Encyclopedia of Food Sciences and Nutrition

Background information

Carob is known as a chocolate substitute. It is free of the chemicals theobromine and caffeine, making this product safe for use in pet foods and others sensitive to these chemicals. Carob is produced from the pod of a Mediterranean tree, *Ceratonia siliqua*.¹ This tree also grows in southern North American. The seeds within the pods, commonly called locust beans are used to make a food gum (thickening) agent.^{1,2} Carob is higher in fibre and higher in sugar (sucrose) content than cocoa beans and is often used mixed with cocoa for the production of "chocolate" products, such as chocolate beverages, both as an extender and sweetener.

The typical process for producing carob powder is similar to that used for cocoa, with the omission of the fermentation step (cocoa is typically fermented to produce flavors for chocolate, see process diagram at right).³ In carob manufacture, carob pods are washed, deseeded, roasted, and milled into powder.

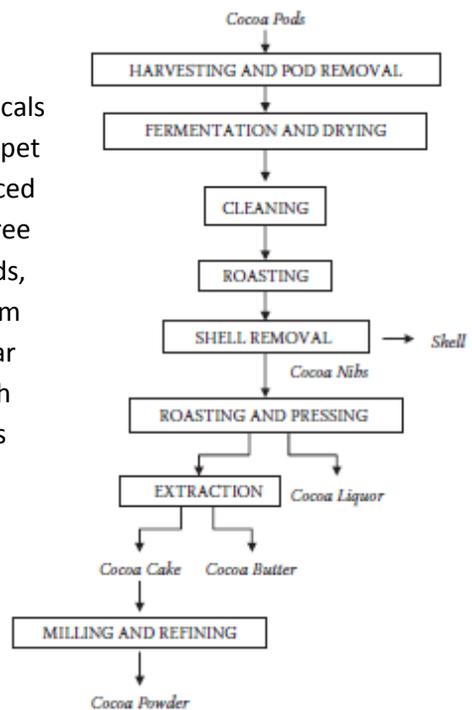


Figure 1
Overview of cocoa pods for chocolate processing

The roasting temperatures may take place between 80°C and 400°C, but typically optimal flavours occur at a roasting temperature of 150°C for approximately 60 minutes. The roasting step will eliminate potential biological hazards found on the carob pods.⁴

What are the risks associated with carob?

Despite extensive searching of various sources no outbreaks were found associated with the use of carob. Additionally, no Canadian recalls have been associated with these products in 2011-2012. One recall was noted in the US, but this was an allergen recall related to undeclared milk, and not any hazard related to the carob product itself.

However, one must presume that the risks for this product will be similar to those of cocoa powder and chocolate.³ These will include physical hazards, such as stones, metals or woods introduced from grinding/blending; chemical hazards such as mycotoxins and aflatoxins and also allergens such as tree nuts, should the operation also be using nuts during processing; and microbiological hazards, such as *Salmonella*.³ Once produced into a powder form, any pathogens not destroyed by previous processing, or introduced into the product, will pose a potential risk. The primary hazard for chocolate is *Salmonella*, a pathogen able to survive in low numbers in low-water activity foods.⁵⁻⁹ Verotoxigenic *E. coli* and *Listeria monocytogenes* have also been associated with chocolate products.^{10,11} Pathogen associated with tree-nut and chocolate (cocoa) outbreaks, occur presumably from exposure to the environment and animals that may carry this pathogen.⁶ As carob pods are harvested from trees, it should be assumed that these products are subject to the same risk. In addition, some cultures do ferment carob pods during the food process. In one paper, a referral to the potential soil foodborne pathogen *Bacillus cereus*, and the production of heat-stable emetic toxin, cereulide was noted.¹²

Previous guidance on processing and manufacture from British Columbia

To our knowledge, there are no facilities manufacturing raw chocolate in BC. There are companies that purchase large quantities of chocolate, melt it down, and manufacture speciality chocolate in BC, such as Purdy's (their web-site states they use chocolate from Belgium, likely Callebaut).

Previous guidance on use of chocolate is to source ingredients from reputable suppliers who have good manufacturing practices and quality assurance procedures in place. Companies should be able to provide certificates of quality assurance that products are tested for and free of pathogens, such as *Salmonella*. We have issued no previous guidance on manufacture of raw chocolate or raw carob powders.

Guidance on processing of carob into powder or chocolate elsewhere in the world

Processing of carob powder usually includes a roasting step.⁴ The act of roasting further reduces the pH of the carob pod, non-roasted carob pods have a much higher pH (pH=6.0) in comparison to roasted carob pods (pH=4.8).⁴ Very little literature was found on techniques for preparing carob powders or chocolates, presumably as these activities occur in Mediterranean countries, and are not published in English.^{2,4}

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There are, however, on-line sources that describe how to process carob, such as <http://www.instructables.com/id/How-to-Process-Carob/>. In this example, carob appears to be picked from trees grown locally (California?), the basic processing steps listed were:

1. Wash and boil carob pods
2. Split pods with a knife
3. Deseed
4. Dehydrate and grind the pods
5. Dry in oven at low temperature or in the dehydrater (no temp is given)
6. Blend
7. Sift (to remove physical hazards)
8. Use powder to make carob chocolate

Other on-line information exists for companies who manufacture carob for export, however, very little detailed information about food safety or QA for these products exist. Examples of companies selling carob powder and products include:

<http://www.regenafarm.com/carob/>

<http://www.carob-powder.com/index.php?id=0&r=accueil>

http://www.famarco.com/catalog/?page=shop/about_us

Recommendations from BCCDC

Although little information could be found regarding processing of carob, or the potential hazards associated with carob manufacture, it is expected that this product behaves similarly to cocoa.

- We do not recommend making RAW carob products. However, should the client wish to include a roasting or dehydration step in the process, this would likely mitigate the biological pathogen hazard.
- Careful attention should be paid to other chemical hazards, such as mycotoxins and aflatoxins and the potential for introducing allergens.
- Physical hazards could be eliminated by screening and sifting the powder after it's made.
- Strict hygiene and equipment sanitation are also required so further biological hazards are not introduced into the product after the roasting/dehydration step.

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References

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