

Study Tour to Europe to investigate New Chestnut Processing Technologies and Value-added Products

Brian Casey
Australian Chestnut Company

Project Number: CH08000

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Level 7
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Fax: (02) 8295 2399

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STUDY TOUR TO EUROPE TO
INVESTIGATE NEW CHESTNUT
PROCESSING TECHNOLOGIES AND
VALUE-ADDED PRODUCTS

(OCTOBER 2008)

Brian and Jane Casey
Australian Gourmet Chestnuts

Horticulture Australia Project Number: CH08000

Project Leader: Jane Casey
Australian Gourmet Chestnuts
233 Hughes Lane
Eurobin Vic 3739
Ph: (03) 5756 2788

Key Personnel: Brian Casey
Australian Gourmet Chestnuts
233 Hughes Lane
Eurobin Vic 3739
Ph: (03) 5756 2788

Purpose of report:
Study Tour to France and Italy to investigate the current technology in chestnut processing equipment and chestnut value added products.

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Australian Gourmet Chestnuts

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Executive / Media Summary

In 1996 Frank Smalls were commissioned by the chestnut industry to study “Increasing chestnut penetration and usage frequency”. They determined that the single most important factor inhibiting the uptake of chestnuts as part of a normal diet was that they are time-consuming to peel. Since then, a number of individuals within the chestnut industry have investigated the feasibility of processing chestnuts.

There are currently three chestnut processors in Australia, one based on chestnut flour, the second on frozen chestnut meal and the third on frozen peeled whole chestnuts that are currently processed off shore in China. All are relatively small producers and whilst there is a clear need for a value added chestnut products there are two issues which need to be addressed before processing in Australia can become a reality. Firstly, and most importantly, there needs to be an established demand for processed chestnut products and secondly the cost of production in Australia needs to be accurately determined and considered to be economically feasible. Without a known demand at the price level determined by the cost of production, it is impossible to make large capital investment decisions regarding Australian based production of frozen peeled chestnuts.

The study involved investigating current European chestnut peeling technologies and assessing their potential for the Australian industry. In addition, many value-added products were tested for their possible introduction to the Australian market. European culture embraces the chestnut and they are part of the normal day to day eating habits of many French and Italians. The per capita consumption of chestnuts in Europe is estimated to be 500g per year, compared to Australia which is estimated to be 1 NUT per year. The nuts are not only eaten as hot roasted chestnuts but there are a variety of purees, cakes, biscuits and confectionary made using chestnuts. Every patisserie has a chestnut cake of some kind and the expensive marrons glaces are a common Christmas gift.

Desk top research into processing machinery from 1996 was used as a base and since then a number of improvements have developed in machinery design. The Boema Company in North West Italy are now clear market leaders in chestnut processing equipment and their machinery is very high quality. The costs of machinery are very high and in addition to the base components additional funding would be required for freight, installation and the establishment of a complete food grade processing facility

There is a catch twenty two situation in the Australian chestnut industry. With a relatively unknown and untested market for processed chestnut products it is unlikely that an investment of the size required can be made at the current time. If the market for processed chestnuts can be developed and expanded using the current Australian processors then in the future, once the market has reached a critical point, a substantial investment into processing equipment will be justified.

Introduction

In 1996 Frank Smalls were commissioned by the chestnut industry to study “Increasing chestnut penetration and usage frequency”. They determined that the single most important factor inhibiting the uptake of chestnuts as part of a normal diet was that they are time-consuming to peel. Since then, a number of individuals within the chestnut industry have investigated the feasibility of processing chestnuts.

In 1997, Brian and Jane Casey of Australian Gourmet Chestnuts undertook desktop research of the then current mechanical chestnut peeling machinery that was available in Europe. This research revealed that the cost of setting up a processing facility in Australia would involved a significant investment which at that time no one was prepared to make. Since then, they have commenced peeling Australian chestnuts in China, shipping the fresh nuts there for hand peeling. This has enabled them to develop a market both in Australia and also in Japan for peeled frozen Australian chestnuts.

With the increased costs of transport and logistics issues in China, they decided to once again look at the potential for developing a processing facility in Australia. The first issue was to investigate any new technologies that have been developed in the past twelve years and then to obtain pricing estimates to calculate if the equipment could be purchased, installed and operated profitably. In addition to this, they also sought to look at new value added products that may be of interest to the Australian industry both as a potential new product for domestic markets and also for potential export markets.

There are currently only three commercial processors of Australian chestnuts producing value added chestnut products. Celebrate Health produces chestnut flour and a range of gluten free pancake and cake mixes based on chestnut flour. The Australian Chestnut Processing Cooperative produces frozen chestnut meal, freeze dried whole chestnuts and freeze dried chestnut flour for the domestic market. Australian Gourmet Chestnuts are the largest processor and exporter of Australian chestnuts and the only producer of frozen peeled Australian chestnuts for both the domestic and export markets. Australian Gourmet Chestnuts also produce sweetened chestnut puree and sweetened chestnuts in syrup as well as a range of chestnut stuffing mixes.

In October 2008 Brian and Jane Casey of Australian Gourmet Chestnuts undertook a study tour of the major chestnut producing regions of Southern France and North West Italy. There were two main objectives of the study tour. The first objective was to investigate the latest chestnut processing technologies and to compare the different types (i.e. steam peeling vs. flame) and the second objective was to investigate new value added products. This report will divide into four main sections, the first two, Chestnut Processing Technologies and Value Added Chestnut Products, cover the outcomes in relation to the objectives with the third describing the itinerary and finally the implications of the information for the Australian chestnut industry:

1) Chestnut Processing Technologies

There are two main types of chestnut peeling processes currently in use in Europe. The most common is the flame or “brulage” oven, also referred to in France as the Aubert oven. This method involves the chestnuts being rotated in an oven and directly exposed to flame from a LPG burner for approximately 30 seconds at 700- 800° C. The outer shell and inner pellicle are burnt off due to the high heat. The nuts then pass along a mesh grill with rubber “beaters” that allow the shells and skins to be separated from the nut. The peeled nuts are then brushed in hot water (70°C) and passed along an inspection table for final sorting. Final results depend greatly of the variety of chestnut being peeled, the temperature and duration time in the oven and preconditioning or partial drying of the chestnuts prior to peeling. In some cases up to 50% of the nuts will require further pellicle removal by hand however recovery rates of up to 80% can be achieved by using easier peeling varieties, preconditioning and fine tuning of both temperature and the duration of the chestnuts in the oven.

The other main type of peeling uses steam and is more common in Italy. As with the brulage method the recovery rates again depend on how easy the variety being used is to peel as well as the condition prior to peeling. First small incisions are made in the inner and outer skins by passing through a cylinder with rotating blades. The blade height is carefully adjusted to ensure no damage is done to the kernel. The partially peeled marked nuts are then elevated into a steam oven where the skins separate from the surface of the nut. They then pass under high pressure jets of hot water and scrubbing brushes that remove the remaining skins. Final inspection and remaining skin removal is completed by hand.

Traditionally the steam peeling technique has been seen as producing superior quality peeled chestnuts compared to the brulage method which can leave burn markings on the peeled nuts. Some processors also claim that the flame can taint the flavor of the nuts but this was disputed by other processors. However producers of high quality processed chestnut products such as marrons glacés predominately use the steam peeling method as the brulage method forms a crust on the outer surface of the kernel making it difficult to absorb the syrup required for the glacé process.

There were visits with two manufacturers of chestnut processing machinery. Three other manufacturers either did not respond or declined our request to visit.

Aubert et Cie - Dordogne, South West France.

Aubert are the original designers and patent holders for the flame oven peeling method. We met with Mr Boisseau and it was his grandfather who designed and built the first oven. These ovens are common in South West France particularly in smaller scale operations. Due to competition from other manufacturers Aubert only now build a few ovens per year to order. He normally builds peeling lines with a capacity of around 300kg per hour and there did not appear to be any recent improvements or modifications in the technology. It was also evident that Aubert are now no longer actively pursuing the manufacturing of chestnut peeling machinery and showed minimal interest in supplying a machine for use in Australia

Boema- North West Italy

Boema are regarded as the leaders in the design and production of chestnuts processing machinery. They construct both brulage and steam peeling lines as well as pre conditioners and a post harvest equipment such as washing, cleaning and grading lines for fresh chestnuts and even a machine that removes stones from the nuts. This occurs with machine harvested chestnuts and appears to be quite problematic for processors in Europe. If stones go through the steam peeling or brulage machinery, they damage cutting blades and the skin removal sections of the machine resulting in expensive repairs.

The brulage line is their most popular and they have constructed some very large capacity lines of 4, 6 and 8 ovens capable of peeling up to four tonnes per hour. Boema claim to have greatly improved the effectiveness of the brulage method and claim that some of the processors are now obtaining similar results as steam peeling with the advantage of greater capacity. The main improvement has been in the design and operation of the oven. The flame in a standard brulage oven is introduced from one end and the chestnuts enter from the other and travel closer towards the flame prior to exiting the oven. With the Boema model there are multiple burners along 1.2 metre oven which allows for more even heat distribution. There is also greater electronic control on the heat and speed of the oven to ensure the chestnuts are not partially burnt or cooked during the process.

1. Steam Peeling Line

There are three main sections to the line, the cutters which pre-cut the outer shell, the shells are then separated with an air leg and the nuts are about 50% shelled after this stage, the semi peeled nuts are elevated into the steam oven which softens the remaining skin/shell, then next stage is an abrasive skin separator which applies warm water spray and co- centric rollers which remove more of the skin. Each oven needs a cutter and cleaner/skin separator so a two oven line would require two cutters and two skin separators. The best recovery rate after this is 65% whole peeled with the balance to be finished off by hand. Capacity is 500kg per hour and at this volume for perfectly peeled nuts you would need a staff of ten to fourteen to finish the peeling.



Boema Sales Manager Marco Cortese explains how the cutter works to Jane Casey



Boema Steam peeling oven (right of picture) and skin separator

2. Brulage Peeling Line

Boema now produce a new improved version of the brulage peeling oven. The main modification is that the heat is now applied via a series of burners that creates more even temperature along the entire length of the oven (approx 1.2 m). The temperature runs at between 650°C and 750°C depending on the nut being peeled and the temperature in the oven is able to be accurately controlled and once the correct settings for the type of nut being peeled have been achieved then there is little burning of the inner kernel. The nuts are inside the oven for between 5-8 seconds only. Capacity of each oven is 500 kg per hour and Boema construct lines with up to eight ovens. As with all brulage systems there is much heat, dust, ash and grit and this process must be kept separate from the main processing area. After the oven, the nuts are elevated to a skin separator that is more abrasive than the steam peeling separator. No water is used up to this stage but most processors use a warm water wash after this stage to re-hydrate the nuts and remove any remaining skin.



Boema two oven brulage line (capacity 1,000kg per hr)

3. Pre Peeling Conditioner.

This is a relatively new process that is now commonly used by processors using both the steam peeling and brulage lines. It effectively dries the chestnuts by 5% just to assist in the ease of pellicle removal. Processors have indicated a 10-15% improvement in peeling efficiency. Typical construction is a large hopper that can hold up to five tonnes with forced air heated to 40°C being pumped into the bottom and sides of the hopper via vented pipes.



Boema high capacity chestnut pre conditioner

There were visits to six chestnut processors.

Conservatory de Bergerac-Dordogne, SW France

Large contract processors of tinned vegetables and chestnuts

Met with Jean-Luc Bellat, Production Manager for chestnuts. This company processes 1500 – 2000 tonne chestnuts per year and at full production 50 tonne per 24 hours using a Turratti brulage peeling line with eight ovens. Nuts are pre conditioned at 40°C for twenty minutes with the heat supplied from the ovens. After brulage peeling the nuts are put through hot water and brushing line that is normally used for other vegetables such as carrots and potatoes.

Mainly produce tinned whole chestnuts in water (5% sugar, 2% salt). They produce for many different customers so no labels are put on the tins until they are sold.

In 2008 the company was not peeling local chestnuts because there was a very poor crop due to a wet spring and then a very dry summer. To maintain production, frozen peeled nuts from Portugal were being used. He believes the production of chestnuts in France is declining and production of cost effective processed chestnuts in Portugal and Spain is increasing.

Mourjou Chestnut Museum- Cantal Region, France

Locally made brulage machine based on Aubert oven but quite basic and small. Capacity was 25 kg per hour and it was running at approximately half capacity due to variety being used. There were few nuts fully peeled and the oven burnt many of the nuts. Overall the quality of the peeled nuts was poor and most required some degree of hand cleaning. Post oven brushes needed replacing as they were too soft and this would improve the peeling efficiency. Cost of machine was 12,000 Euro and it was a one off prototype machine from the manufacturer.



Mourjou Chestnut Museum mini brulage oven (capacity 25kg per hr)

Sabaton- Ardeche Region, France

Tour of Sabaton processing company by Christophe Sabaton, **Directeur Général**.

Sabaton are makers of Marrons Glaces, chestnut puree and chestnut pate and whole chestnuts in syrup (confits).

They process 1,200 tonne fresh chestnuts per year and locally sourced nuts (Ardeche AOC) account for approx 20% of supply but this varies from year to year depending on harvest. In 2008 only 5% were sourced locally. Majority of fresh came from Italy and then Spain and Portugal. On arrival all consignments are assessed for internal nut quality including internal rots and worms and compartments. There was a 10% tolerance for rots and worms. The assessment for internal compartments was only relevant if the nuts were to be used for marrons glace or confit. After passing the initial assessment all nuts were floated with all floated nuts being discarded.

Puree – made from fresh nuts either immediately on arrival to factory or from frozen nuts in shell later in the year.

Fresh (or frozen) nuts in shell are cooked and then squashed and the shell separated from the cooked nut meat. The nut meat then has sugar syrup added and is cooked and then tinned or packed into jars and sterilized.

Marrons glace – due to the poor harvest in northern Europe in 2008, Sabaton are currently importing frozen peeled chestnuts primarily from Italy but also some from Portugal for their production of Marrons Glace. Ninety percent of production of whole sweetened chestnuts is sold as confit with 10% sold as finished marrons glace. The main market for marrons glace is Christmas with most being for gifts hence the beautiful packaging. Approximately eighty percent of all marrons glace production is sold during the festive season.

Marrons glace production is a very involved process. Two nuts are wrapped by hand with a mesh cloth known as a sock even though it is a flat piece of cloth. These little parcels are packed into a perforated metal tray – semi-circular in shape with about 3 layers per tray. Diameter of tray was approx 1m. They were then cooked in hot water for 1- 4 hours then drained and immersed in sugar syrup. Vanilla beans are added and they are cooked for a further 24 hours. The syrup starts as light syrup and the concentration of sugar increases until the final level is obtained. The syrup is circulating constantly as it increases. The nuts are then left in the final syrup for a further one to four days. After that they are removed from the cooking vats and placed with their syrup in containers in a cool room at 4°C until required (must remain there for at least another week prior to further processing).

Imbert - Marrons de Aubenas

Visit to Alexandre Nogier, Directeur of Imbert in Aubenas. Imbert uses 600-700 tonnes of fresh per year. This company is similar to Sabaton in its product line making marrons glace, confit and puree. Traditionally this company used only hand-peeled chestnuts for its premium marrons glaces but due to increasing costs recently installed a Boema steam peeling line. All puree production is made using steam peeled chestnuts rather than the cook and squash method as he can remove more defective nuts using this method. When we visited the peeling line was operating for puree production and running at full capacity. When peeling chestnuts for marrons glace the speed of the line is reduced and more staff are required to ensure higher quality of finished product. Mr Nogier emphasised that a great deal of expertise is required to ensure the peeling line operates as efficiently as possible and that even using the same size nuts and the same variety constant adjustments are necessary.

Marrons de l'Aveyron-Cantal Region, FRANCE

Met with Madame Clermont at her stand at the Mourjou Chestnut Festival. They are a family run business that grows, processes and markets chestnuts. They have an Aubert brulage oven but do not have a specific skin separator. They use a potato peeler after the oven to assist in further skin removal. Final removal is done by hand. They can peel up to one tonne per day with five or six staff. They produce whole peeled cooked chestnuts in jars and a range of flavoured chestnut purees. Burn marks were clearly evident on the whole peeled chestnuts. They mainly market their produce at festivals and market days as well as to local shops.

Castelleno-Cuneo Region, ITALY

This company is a buyer and packer of fresh nuts and producer of dried chestnuts, chestnut flour and puree.

In 2008, 2000 tonne was being graded packed and processed but in a good year this could be as high as 3000 tonne. Grading equipment was able to grade by one millimetre increments and there was a sterilizing line after which the nuts were floated (bad nuts removed) and then good nuts were dried in Boema drying line (removal of surface moisture only, no heat only ambient forced air) not to be confused with drying chestnuts for preservation. Prior to packing, the nuts were polished with an oil/wax suitable for foodstuffs. Packing was fully automated with weighing, bagging, labelling done with minimal labour. Most packaging was netting (black and some red) but the very high quality large nuts were packed in 5kg printed hesian bags. They had a 900 tonne freezer capacity which held many tonnes of frozen fresh nuts still in shell

2) Value Added Chestnut Products

An extensive range of chestnut products were observed and sampled during the study tour. This ranged from the well known and traditional products such as marrons glace, puree and chestnut flour to more the innovative such as biscuits, flavored purees, a kind of pilaf mix using dried chestnut bits and chestnut confectionary such as chestnut flavoured jellies.

As well as value-added products at retail stores many restaurants and patisseries in France and Italy feature chestnut dishes. Beautiful meringue discs sandwiched with chestnut cream, or wonderfully luscious Mont Blanc cake were common. Guinea fowl or other game meats with savoury chestnut puree, foie gras with chestnut and the special 'Cousina' chestnut soup were found in many restaurants. In the Ardeche region of France they have a special dessert called 'Coupe Ardechoise'. It is a combination of sweet chestnut puree, marrons glace or marrons confit, vanilla ice cream, cream and sometimes pieces of meringue.

Chestnuts form a part of the local 'normal' diet in these regions and they are not seen as a novelty food item. They are a traditional food that is tied to the cultural history of the people. When you talk to local Italians in the Cuneo region they immediately talk about tough times and having to literally 'live' on chestnuts for survival. If they were a staple then it would be very boring to eat them the same way day in and out. It is probably this necessity that created the development of so many varied ways to cook and eat chestnuts.

As in Australia, people in Europe are getting more time sensitive in terms of meal preparation and value-added chestnut products are constantly being developed to meet this trend. In 2002 we observed sweetened chestnut puree but in 2008 this had expanded to a range of flavoured purees that included chestnut and chocolate, chestnut and apple, chestnut and orange, chestnut, rum and raisin, chestnut and walnut, chestnut and vanilla, chestnut and honey. Pre-made chestnut and mushroom soup was on the supermarket shelves alongside more mainstream soup flavours such as pumpkin and vegetable. Chestnut yoghurt was also in the supermarket with Nestle having plain marron as well as marron and apple yoghurt.

There is a great potential for chestnuts to become a focused regional food of North East Victoria. With over 70% of the total Australian crop grown in this region it has a very similar status to the Ardeche region of France. Through a combination of value-adding and tourism, a facility such as the 'Biscuiterie' has the capability to educate consumers and increase awareness and ultimately consumption of this versatile food. Products such as the chestnuts in jars may not be so readily accepted in Australia where consumers are unfamiliar with the product. The appearance is a deterrent for first time users and whilst this may be overcome with education it is easier to work with value added foods that have a more attractive form.

The following is a sample of some of the more interesting products that we discovered during the tour.

Value-Added Chestnut Products



From left to right, chestnut and almond biscuits, chestnut flour, marrons confits (Sabaton), chestnut flavoured champagne, chestnut puree (3 different jars), chestnut gâteau, marrons glaces, chestnut liqueurs (at rear), chestnut pilaf mix, chestnut confectionary (in front), tubes of sweetened puree, marrons confits (Imbert), chestnut beer and chestnut honey.

Marrons Confits

These are the precursor to the marrons glaces. They are chestnuts preserved in heavy sugar syrup and consumers would generally use them in desserts as decorations either glazed or directly out of the jar or as a petit four. Each nut is very rich and very sweet. They could be purchased as a jar or loose. Prices at the retail level were very high as shown in the photo.

Whilst they are absolutely delicious, the market for marrons confits and marron glace is static and efforts to export have had mixed results.



*Marrons Confits above in jars and sold loose on right (note the €88 kg price).
Cakes decorated with the marrons confits.*



Chestnut Flavoured Yoghurt and Fromage Frais

This product is very common in France in particular. The French are very big consumers of yoghurt and this was delicious. It was a chestnut puree so did not have any pieces of chestnut unlike the fromage frais which did have sweetened chestnut pieces (probably from broken marrons glace).



Organic Chestnut and Mushroom Soup

This soup was discovered by accident in a supermarket – it demonstrates how mainstream chestnuts are in Europe that they would have a chestnut soup as a matter of basic choice in a supermarket.



Chestnut Pilaf Type Mix – Méli-Mélo de Pays à la Cévennoise.

This was not tasted and was sent back to Australia by post. The Australian customs confiscated it on arrival due to the fact it contained grains. The product was not seen in any retail stores but found at a grower stand at a chestnut festival in Joyeuse in the Ardeche.



Peeled Chestnuts in Jars

These were common especially in France and are brulage peeled chestnuts preserved in a jar. There is no added water or syrup – they are simply put into a jar which is then heat treated to sterilize. The burn marks on the nuts can be seen as well as general discolouration. The nuts do not look particularly appetising however it is a traditional product and consumers do not seem to be put off by the appearance.



Chestnut Puree

A chestnut producer with a range of purees at the Mourjou Chestnut Festival.



Chestnut Biscuits and Cakes

In the Ardeche region chestnuts play a pivotal role as a regional food, not only in the culinary aspect but they are also very important from a tourism perspective. A shop featuring nothing but biscuits and cakes made using chestnuts near Aubenas in central Ardeche has become a tourist destination in itself. The *Biscuiterie Les Châtaignettes* has posters and brochures all over the Ardeche and tourists flock there at all times of the year. The range of biscuits was impressive from light lace-like varieties to heavier shortbread types. Chestnut flour was the base but the chestnut was complemented with almond, orange, chocolate, walnut and hazelnut. The variety was amazing and the layout of the store was very impressive. As well as biscuits they also had a range of single serve cakes, chestnut confectionary and chestnut liqueurs.



Biscuiterie Les Châtaignes



Chestnut and Almond Biscuits



Display of Chestnut Liqueurs

Study Tour Itinerary

Monday 13 October	12:00 pm	Henri Breisch Researcher, Ctifl BERGERAC (SW France)	Lunch meeting at Bergerac with Henri Breisch
	2:00 pm	Ctifl Research Station, BERGERAC	Inspected research orchard approx 3 ha in size, age 15-20 years, main varieties, Marsol, Marigoule, Bouche de Betizac and Maravelle. Maravelle and Marsol mainly used as rootstock. Observed rust (viral infection that causes leaves to fall off prematurely) and blight infected trees. Two additional trial sites, one was for phytophthora resistant rootstock, and the other was to develop new varieties suitable for use in mechanical peeling.
	3:30 pm	Phillipe Menard and Natalie Pasquet CIERA Research Station DOUVILLE	Visited trial site and observed harvesting using netting. Nets are pegged on the ground each side of the tree in strips up to 200m. The nuts are harvested 3 times per season. The end of the net is fitted to a drum roller and as the nets are rolled in, all the nuts, leaves, burrs were dragged along the ground and lifted to a high speed conveyor, elevator and then into the collection bin. This was then transported back to the main shed for deburring and sorting. The sixty metre long net that was observed took approximately five minutes to haul and then another five minutes to re-lay and peg ready for the next day.
Tuesday 14 October	9.00 am	Bertrand Guerin President Les Bitarelles en Perigord Grower Cooperative	Visit to his orchard, they were harvesting the last of the crop. 1000 trees on 8 ha. Two plantings, one Bouche de Betizac on 7 x 7 spacings and the other was Marigoule on 10x 10m spacings. He had a very good 2008 crop with production around 23 tonne. Irrigation was fully automated and had recently installed soil moisture monitoring equipment that has improved irrigation efficiency. Main harvesting was done by four Portuguese pickers working full time and he was paying 15 Euro per hour.

Tuesday 14 October (con't)	10.30am	Les Bitarelles en Perigord Cooperative collection site	Farmers bring their harvest to a number of local points. Tuesday and Friday are pickup days. Nuts are dropped off in co-op provided plastic bins with the weighing of bins and quality assessment taking place on arrival at the co-op. The co-op also pays the transport fee.
	11.00am	Patrick Marty Sarl Fruits Rouges du Perigord	Patrick's main business is berries but has now expanded into chestnuts. He deals with fresh chestnuts only and buys and sells immediately – basically is a packer or “private co-op” We observed the grading and packing line in operation Sizes for grades 20, 28, 30, 32, 34, 36. Packs in wooden packaging (loose 5 kg crates with cellophane or netting sheets stapled over the top).
	Lunch	MONTPAZIER	Lunch meeting with Bertrand and Patrick.
	3:00	Domaine de Rapatel VILLAFRANCE-DU - PERIGORD	Chestnut growers who have expanded to value-add. They dry nuts and make flour with a stone mill. We observed the mill in operation. After initial grinding the flour was sifted and re-ground. They also have farm stays, and an on farm retail outlet with a variety of chestnut flour products that they produce such as cake mixes, biscuits and liqueurs. Also run chestnut themed eco tourism days which include grafting demonstrations, varietal evaluation, cooking classes and flour production.
Wednesday 15 October	9:30 am	Aubert et Cie Perigord	Meeting with Mr Boisseau and inspection of workshop and discussion on brulage peeling machinery. A small operation with no new technology – same machine as developed by his grandfather. Only makes smaller scale machines to order.
	PM	Travel	Travel to Mourjou
Thursday 16 October	9:30am	Market Day MAURS (CANTAL)	Observed fresh chestnuts on sale and there was a community promotional event where roasted chestnuts and apple juice were distributed free of charge.

Thursday 16 October (con't)			The local variety peeled well and the taste was sweet. The community atmosphere was obvious and children and older people joined in the festivities making it an extended family event. Visited local gourmet food shop “The Chataigneraie” and observed large range of chestnut products on display
	PM	AURILLAC	Visited Mr Coudrouc who produces chestnut liqueur and aperitif and is a member of the Confrerie de Pelou.
Friday 17 October	All day	Consertavory de Bergerac BERGERAC	Meeting with Chestnut Production Manager (Jean Luc Bellat) and inspection of eight oven brulage peeling line (not in operation) as well as the canning lines.
Saturday 18 October	All day	MOURJOU (CANTAL)	Attend festival and inspected stands – afternoon chestnut walk through local forest.
Sunday 19 October	All day	MOURJOU	Attend festival; observe official opening ceremony and awards.
Monday 20 October	AM	MOURJOU	Visit to La Maison de la Châtaigne and meeting with Michelé the curator
	PM	Small Scale Brulage Chestnut Peeling Machine	Observed locally made brulage machine in operation. Based on Aubert oven but quite basic and very limited capacity.
Tuesday 21 October	All day	Travel	Travelling day from Mourjou to Vals des Bains (ARDECHE)
Wednesday 22 October	AM	Biscuiterie les Châtaignettes SAINT PRIVAT (ARDECHE)	Most extensive range of products using chestnut flour and puree. Biscuits made from chestnut flour and including a multitude of flavourings including walnuts, hazelnuts, orange, vanilla, honey, almonds.

Wednesday 22 October (con't)		Biscuiterie les Châtaignes SAINT PRIVAT (Con't)	There were different styles of biscuits, some like shortbread others were very light like a kind of macaroon and others cake-like soft cookie type concoctions. They also had a wide range of liqueurs and cordials and syrups and also confectionary - all chestnut based.
	PM	PRIVAS	Visit to Privas which is the capital of the Ardeche department, toured local chestnut produce shops.
	PM	Dinner at Hotel du Levant NEYRAC-les-BAINS	Chestnut degustation dinner. Of particular note was the trio of chestnut desserts. Chestnut liqueur cream with chestnut macaroon, chestnut ice cream in a mini waffle cone, chestnut crème brûlée.
Thursday 23 October	AM	Sabaton AUBENAS	Tour of Sabaton processing company by Managing Director Christophe Sabaton. Makers of Marrons Glaces, chestnut puree, chestnut pate and whole chestnuts in syrup. Observe puree production line and marrons glace in operation.
	PM	Chateau Clement VALS-les-BAINS	Chestnut Cooking Class Eric Cabout conducted a three hour cooking class focusing on the production of marrons glace using confit chestnuts. Recipes included chestnut fondant pudding, chestnut ice cream, chestnut soup, chestnut cream for accompaniment for roast pork or game meats. See Appendix for recipes.
Friday 24 October	AM	Marrons Glace D'Aubenas AUBENAS	Meeting with Alexandre Nogier, Managing Director Makers of Marrons Glaces, chestnut puree and whole chestnuts in syrup (confits). Invited to return on following Monday to observe Boema steam peeling line in operation.
	PM	VALS-les-BAINS	Tour of Vals des Bains inspecting specialty shops featuring local produce including many chestnut products Dinner at Hotel Helvi was a special chestnut degustation menu that had been pre-arranged. See Appendix for menu details.

Saturday 25 October	AM	Salon Gourmand et Artisanal JOYEUSE	Visited the chestnut festival at Joyeuse. This festival is aimed more at artisan chestnut food products (Gourmand et Artisanal). There were roasted chestnuts, but also people selling biscuits, gateaux, crepes and also kind of chestnut pilaf. There were lots of musicians and artists and a very relaxing atmosphere.
	PM	Fete de la Chataigne ANTRAIGUES	Travelled to Antraigues in the mountains of the Ardeche and booked into accommodation. Visited the stands at the festival and did a guided “randonne” through chestnut orchards including a pruning demonstration of a very old and blight affected tree. As part of the festival there was another chestnut degustation buffet which we attended.
Sunday 26 October	AM	ANTRAIGUES	Did a more substantial (three hour) guided walk through traditional terraced chestnut forests. Visited a modern chestnut drying and flour production facility. The facility had three drying units (2-3 tonne each) using forced heated air.
Monday 27 October	AM	Marrons Glace D’Aubenas AUBENAS	Revisited Imbert to look at chestnut steam peeling line in operation. Nuts being processed were for puree only. Machine was operating at maximum capacity and with only two staff on the inspection table. When the line is running to peel nuts for marrons glace, the machine is slowed to approximately 50% capacity and there is fourteen staff on the inspection line.
	PM	Travel to PRIVAS	Overnight in Privas
Tuesday 28 October	AM	Visit to Clement Faugier PRIVAS	Visited Clement Faugier, the largest makers of marrons glaces, chestnut puree and whole chestnuts in syrup. Participated in a tour including an audio visual presentation and tastings.
	PM	PRIVAS	Sampled marrons glaces from Imbert, Sabaton and Clement Faugier as well as sweetened puree. Taste tested each one. See attached for results and photos

Wednesday 29 October	All day	CUNEO (NW Italy)	Travel from Privas to Cuneo (all day)
Thursday 30 October	10:00	Visit to Boema, NIEVE	Met with Sales Manager Marco Cortese. Inspected steam and brulage peeling lines which were 95% completed and almost ready to be delivered. Also observed chestnut washing and sterilising machinery.
	3:00 pm	Castellino Cuneo	Buyer and packer of fresh nuts and producer of dried chestnuts, chestnut flour and puree. Met with Eugenio Castellino, Managing Director and toured facility in full operation.
Friday 31 October	AM	Cuneo	Visited local produce shops and café featuring chestnut cakes and marrons glaces and chestnut ice cream.
	PM	Guido Bassi	Meeting with Guido Bassi orchardist who is a nurseryman and supplier of grafted chestnut trees to the industry as well. Visit to his nursery was cancelled due to bad weather.
Saturday	All day	Travel from Cuneo to Nice	Overnight Nice
Sunday 2 Nov	All day	Travel from Nice to Paris	Overnight Paris
Monday 3 Nov	AM	Attended street market in Paris	Observed fresh chestnut sales and street vendors selling roasted chestnuts-quality was very good.
	PM	Visited gourmet food stores	Observed many cakes and pastries using chestnut puree and marrons glaces. It was common to see chestnut cakes in every patisserie and illustrates how chestnuts are an integral part of the French food culture.
Tuesday 4 Nov	All day	Rest day	Packing, report writing
Wednesday 5 Nov		Depart Paris	Depart Paris for Melbourne via Singapore.

4) Recommendations for the Australian Industry

- Although the authors conducted detailed research into suitable chestnut peeling technologies, further research needs to be undertaken to determine accurate production costs for peeling Australian chestnut varieties using both steam and brulage systems. This would involve sending a trial shipment of at least one tonne, possibly more, of Australian chestnuts to Europe to conduct extensive trials to determine which technology is the most efficient for Australian varieties and identify and capture all input costs. Once the exact cost per kilo to produce frozen peeled Australian chestnuts using European machinery has been determined, then further consideration can be given to the financial viability of establishing a chestnut peeling line in Australia.
- The authors recommend that the Industry Advisory Committee agree to allocate a portion of the marketing levy funds to assist in the development of the Australian market for value added chestnut products. If the demand for frozen peeled chestnuts in particular can be increased then this would greatly assist in reducing the commercial risk of establishing a chestnut peeling line in Australia.
- Although it is yet to be determined if the production of frozen peeled chestnuts in Australia is financially viable, existing Australian chestnut processors should be encouraged to introduce a wider range of value added products using chestnut flour. It was clearly evident that products such as biscuits, crepes and cakes made using chestnut flour are becoming more prevalent and widely available in Europe. The most common response for the increase was the increasing awareness of the health benefits of chestnut flour compared to wheat and other grain flours. Australian producers should be encouraged to invest in low cost machinery to dry and mill their chestnuts to assist in the expansion of the Australian value added chestnut market.
- An invitation should be extended to Henri Breisch, a highly regarded and very experienced chestnut researcher currently working at CTIFL in south west France, to visit Australia and meet with local producers and key industry stakeholders. Ideally he could be invited as a keynote speaker for either a Chestnuts Australia Inc Annual General Meeting or the next Australian Chestnut Industry Conference. The authors have met with Henri on previous study tours in 2002 and 2004 and he has always been very willing to share information on the substantial research projects undertaken in France and indeed all of Europe. Henri has over thirty years expertise in chestnut varietal evaluation and cloning, propagation, harvesting, post harvest storage and value adding and his visit would be highly beneficial to the development of the Australian industry.

Recommendations for the Australian Industry (con't)

- Further consideration should be given to the prototype net harvesting system that the authors observed in Douville research station. If the trials are considered successful in France then more detailed information should be supplied to interested Australian producers and possible adoption. A DVD of the system in operation will shown at an industry event and copies and contact details made available to interested producers.

Information dissemination

A presentation will be made to the Chestnuts Australia Inc Board regarding the recommendations from the outcomes of the study tour. Both Brian and Jane have offered to speak at Chestnuts Australia functions such as the Annual General Meeting and an article is being prepared for the winter edition of the Australian Nutgrower magazine. An overview of the study tour will also be submitted for the CAI newsletter publication “Nuts and Burrs”

Contact List

Marrons Glaces D'Aubenas

Chemin de Bourgneuf
07202 Aubenas-FRANCE
PH 04 7535 1339
www.marrons-imbert.com

Sabaton

La Plaine
07200 Aubenas-FRANCE
PH 04 7587 8383
www.sabaton.fr

Clement Faugier

Le Logis du Roy
07001 Privas-FRANCE
www.clementfaugier.fr

Domaine de Rapatel

Villafranche-du-Perigord-FRANCE
PH 05 5330 4405
www.chataigneduperigord.fr

Chestnut Festivals in Ardeche

Monts D' Ardeche
Castagnades D' Automne
www.castagnades.fr

Chataigne D'Ardeche

4,Avenue de l'Europe Unie
07001 Privas-FRANCE
PH 04 7564 0461
www.chataigne-ardeche.com

Hotel du Levant***

Restaurant Brioude
Neyrac-les-Bains-FRANCE
PH 04 7535 4107
www.hotel-levant.com

Hotel Helvie***

Restaurant Les Vivarais
Avenue Claude Expilly
07600 Vals-les-Bains-FRANCE
PH 04 7594 6585
www.hotel-helvie.com

Biscuiterie Les Chatâignettes

Route de Lussas, Saint Privat-FRANCE
PH 04 7535 9302
www.les-chataignettes.fr

Fratelli Castellino

Torre Bongiovanni
12089 Villanova Mondova- ITALY
PH 0174 597 384
www.fratellicastellino.it

Mourjou Chestnut Festival

Association du Pelou
Le Mas 15340 Mourjou-FRANCE
PH 04 7149 6934
www.foirchataignemourjou.fr

Aubert et Cie

Ave de l'Industrie
24660 Coulouniex-Chamiers - FRANCE
PH 53 535 617

BOEMA S.p.A. / Ufficio Commerciale
C.so R. Scagliola, 197
12052 Neive (CN) - ITALY
PH 0173 678711
web: www.boema.com

Henri Briesch
Department Fruits et Technologie
Responsable Technique du CIREA
Centre Interregional d'Experimentation
Arboricole
Lanzade
PRIGONRIEUX
LA FORCE 24130
PH +33 5 53 73 07 32

Bertrand Guerin
President
Les Bitarelles en Perigord
Clottes
24440 Nojals
Ph: +33 683 05 45 64
Fax: +33 553 27 03 40

Patrick Marty
Salr Fruits Rouges Du Perigord
La Chune
Route de Bleves
24540 CAPDROT

APPENDIX (i)



FOLLOW OFFER N° 86508

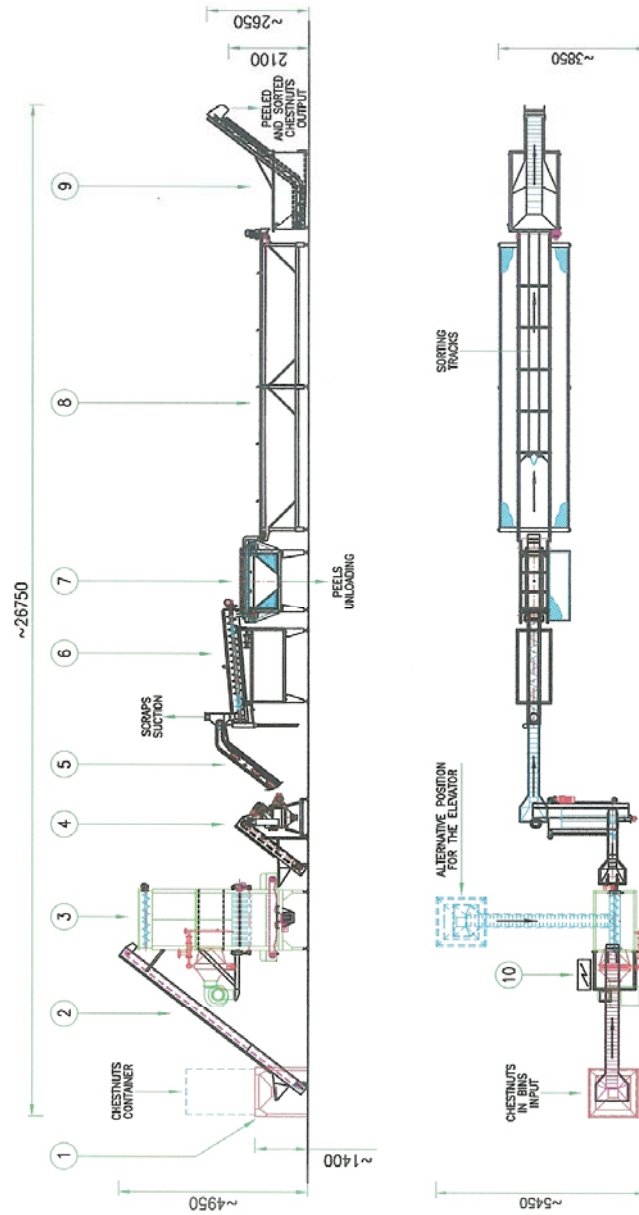
Dd. 09/12/2008

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ITEM N	Q.	DESCRIPTION
		<p align="center"><u>STEAM PEELING LINE FOR CHESTNUTS</u></p> <p><u>Production capacity:</u> max 600 kg/h. of input product. <u>Reference:</u> enclosed technical drawing.</p> <p>The line will be composed of the following machines:</p>
1	1	SUPPORTING FRAME
2 OPT	1	PVC STRAIGHT ELEVATOR MOD. EL20/3 (OPTIONAL)
3 OPT	1	PRE-DRYER MOD. PSS/16 (OPTIONAL)
4	1	MULTIPLE-BLADE SHELL-SCORER MOD. J1/1B
5	1	SWAN INTRALOX NECKED ELEVATOR-BATCHER MOD. EL22C
6	1	WORM SCREW PARBOILER MOD. SB/C
7	1	SKIN SEPARATOR MOD. SP/P
8	1	SORTING BELT MOD. NC/X/8/800
9 OPT	1	SWAN NECKED ELEVATOR MOD. EL22C IN TANK MOD. V29G (OPTIONAL)
10	1	ELECTRIC CONTROL PANEL
10.1 OPT	1	SUPPLEMENT TO THE ELECTRICAL PANEL (OPTIONAL)

ITEM N	Q.	DESCRIPTION
		<p><u>DESCRIPTION OF THE PROCESSING PROCEDURE</u></p> <p>Bins, containing cleaned and sized chestnuts, are placed on a suitable frame -1- in order to feed the loading hopper of the elevator -2-.</p> <p>From this point product is lifted to load the pre-dryer -3-, where it stays for approx. 40 minutes at a temperature of 55°C.</p> <p>Coming out from the pre-dryer chestnuts go to the multiple-blade shell-scorer -4-. The shell scorer makes several micro cuts on chestnuts' shell to enable steam penetration.</p> <p>Afterwards, chestnuts go to the Intralox elevator-batcher -5-.</p> <p>From the elevator, product is fed into the worm screw parboiler -6- and from here, to the skin separator -7-. Afterwards, chestnuts are discharged onto the sorting belt -8-, where operators will check it and finish chestnuts peeling.</p> <p>By the sorting belt, chestnuts are transferred to the tank -9- prearranged to feed the freezer.</p> <p>The whole line is controlled by the electrical panel -10-.</p>

STEAM PEELING LINE FOR CHESTNUTS



10	ELECTRIC CONTROL PANEL	1
9	SWAN NECKED ELEVATOR MOD. EL22C IN TANK MOD. V25G (OPTIONAL)	1
8	SORTING BELT MOD. NC/X/8/800	1
7	SKIN SEPARATOR MOD. SP/P	1
6	WORM SCREW PARBOILER MOD. SB/C	1
5	SWAN INTRALOX NECKED ELEVATOR-BATCHER MOD. EL22C	1
4	MULTIPLE-BLADE SHELL-SCORER MOD. J1/1B	1
3	PRE-DRYER MOD. PSS/16 (OPTIONAL)	1
2	PVC STRAIGHT ELEVATOR MOD. EL20/3 (OPTIONAL)	1
1	BINS SUPPORTING FRAME	1
POSIZ.	DENOMINAZIONE	Q.

boema
MACCHINE ED IMPIANTI PER L'INDUSTRIA ALIMENTARE
BOEMA S.p.A. - CORSO SANAAO 34/36/38
12052 NIVE (CN) - ITALY
TELEFONO 0172/677111 - TELEFAX 0172/677438
e-mail: boema@boema.com - WWW.BOEMA.COM

DRAWING NUMBER
L_PELVAP
UPDATED ON THE
27/03/06
DESIGNER ENGINEER
ROSSO G.
APPROVED
TESTED UNDER REGULATION
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ITEM N	Q.	DESCRIPTION
		<u>DESCRIPTION AND FEATURES OF MACHINES</u>
1	1	<p>SUPPORTING FRAME Made of painted carbon steel, it supports bins and doses chestnuts inside the hopper of the following elevator.</p>
2 OPT	1	<p>PVC STRAIGHT ELEVATOR MOD. EL20/3 (OPTIONAL) The elevator transports the product to a working height to load the following machine. Made of painted carbon steel press-formed plate, it is mainly composed of:</p> <ul style="list-style-type: none"> - side panels fitted with bolts to the sliding table; - draw head with anchorage flanges for mountings with self aligning closed bearings; - return head with anchorage flanges for mountings with self aligning closed bearings and mechanical device for taking up play; - cage draw and return roller; - PVC conveyor belt for foodstuffs with vulcanised plugs; - loading hopper; - discharge hopper; - motorization by means of motorized gear-box; - frame to support the elevator. <p><u>Technical data</u> Dimensions: length 6.000 mm. width 300 mm. Installed electrical power: 0,75 kW.</p>
3 OPT	1	<p>PRE-DRYER MOD. PSS/16 (OPTIONAL) Made of painted carbon steel sections and press-formed plate, it will be composed of:</p> <ul style="list-style-type: none"> - chestnuts containing silo of parallelepiped shape, capacity of 1.600 kg.; - screw mounted on top to spread chestnuts on the whole length; - motorized-gearbox for the screw moving; - electrolevel with rotating paddle to keep the right product quantity inside the dryer; - extraction reel fitted with rollers with special profiles, having pitch movement for an even product extraction; - motorized-gearbox for the reel moving; - device installed on the lower part of the reel for product discharge and drying air holding; - flat belt for product extraction; - battery for heating and hot air blowing inside the Predryer, provided with: centrifugal blower, filter and heating battery with heat exchanger. Such equipment will be equipped with temperature thermo-adjuster with probe and temperature gauge. <p style="text-align: right;">./.</p>

ITEM N	Q.	DESCRIPTION
		<p><u>Technical data</u></p> <p>Overall dimensions: length 3.400 mm. width 1.400 mm. height 3.800 mm.</p> <p>Working dimensions: length 1.500 mm. width 1.000 mm. height 1.600 mm.</p> <p>Steam consumption: 100 kg/h. at 3 bar Installed electrical power: 3,3 kW.</p>
4	1	<p>MULTIPLE-BLADE SHELL-SCORER MOD. J1/1B</p> <p>Made of painted carbon steel, it will be composed of:</p> <ul style="list-style-type: none"> - structure to support the rotating cylinder, which is fitted with suitable cutting blades; - chain conveyor with suitable paddles assembled on the blade cylinder; - screw placed below the cylinder for peels removal; - device for light foreign bodies separation with fan assembled on belt output; - loading and discharge hopper. <p><u>Technical data</u></p> <p>Overall dimensions: length 2.800 mm. width 1.200 mm.</p> <p>Installed electrical power: 3,8 kW.</p> <p>This machine will be provided with loading elevator with PVC conveyor belt, n° 3.120 spare blades, n° 2 supports for spare blade-bearing shaft, n° 2 blade-bearing shafts (one is equipped with n° 156 disks and the other is "bare"), hydraulic power lift for blade-bearing shaft.</p>
5	1	<p>SWAN INTRALOX NECKED ELEVATOR-BATCHER MOD. EL22C</p> <p>The elevator conveys the product to a suitable height to load the subsequent machine.</p> <p>Made of AISI 304 stainless steel press-formed plate and sections, it is mainly composed of:</p> <ul style="list-style-type: none"> - sides and sliding table in a single press-formed and welded piece with wide side openings; - draw head with anchorage flanges for mountings with self-aligning closed bearings; - return head with anchorage flanges for mountings with self-aligning closed bearings; - draw and return pinions; - Intralox grid conveyor belt with relevant sides and plugs; - supporting runners for belt return; <p style="text-align: right;">./.</p>

ITEM N	Q.	DESCRIPTION
6	1	<p>- lower casing spaced for cleaning operations; - motorization by means of motovariator.</p> <p><u>Technical data</u> Dimensions: length 3.000 mm. nominal width 300 mm. working width 220 mm. Installed electrical power: 0,37 kW.</p> <p>WORM SCREW PARBOILER MOD. SB/C This machine parboils the product with steam penetrating the several cuts in the shell to facilitate their partial removal. Fully made of stainless steel press-formed plate, it is mainly formed of: - product conveying channel having OMEGA reversed section with top guard and perforated bottom for steam injection; - internal worm screw for product feeding; - screw motorization by means of motovariator; - interspace for steam injection placed in the lower part of the channel and fitted with several holes approx. 3 mm. diameter; - insulation of the side and lower parts by glass wool; - pipings for steam injection into the interspace; - n° 3 steam adjusting valves; - steam on-off valve; - condensate drainage valve; - supporting frame made of stainless steel tubulars.</p> <p><u>Technical data</u> Overall dimensions: length 3.400 mm. width 900 mm. Worm screw diameter: 250 mm. Worm screw length: 2.750 mm. Worm screw pitch: 170 mm. Steam consumption: max. 150 kg/h. approx. Installed electrical power: 0,37 kW.</p>
7	1	<p>SKIN SEPARATOR MOD. SP/P This machine strips off the remaining skin by means of rubber rollers. Made of AISI 304 stainless steel tubulars and press-formed plate except for the transmission gears, it is mainly formed of: - set of rubberized small rollers fitted in pairs and counter-rotating; - rubberized sectors to facilitate the removal of the skin; - water system for the shower on the working table; - loading hopper;</p>

ITEM N	Q.	DESCRIPTION
8	1	<ul style="list-style-type: none"> - skin collection hopper; - discharge hopper; <p>The final user must provide to supply the hot water for the washing phases of the skin separators.</p> <p><u>Technical data</u></p> <p>Overall dimensions: length 2.250 mm. width 750 mm. height 1.400 mm.</p> <p>Work table dimensions: 310 x 1.800 mm. Installed electrical power: 1,5 kW.</p> <p>SORTING BELT MOD. NC/X/8/800</p> <p>The conveyor enables personnel to sort unsuitable product. Made of stainless steel tubulars and press-formed plate, it is mainly formed of:</p> <ul style="list-style-type: none"> - draw drum mounted on self-aligning bearings and controlled by a suitably powered motovariator; - return drum also mounted on self-aligning bearings, provided with a suitable system for the mechanical take-up of play; - PVC sorting belt for foodstuffs with sorting tracks; - side platforms for the sorting personnel. <p><u>Technical data</u></p> <p>Overall dimensions: length 8.200 mm. width 2.000 mm.</p> <p>Work table dimensions: length 8.000 mm. width 800 mm.</p> <p>Installed electrical power: 1,5 kW.</p>
9 OPT	1	<p>SWAN NECKED ELEVATOR MOD. EL22C IN TANK MOD. V29G (OPTIONAL)</p> <p>The elevator conveys the product to a suitable height to load the freezer. Made of stainless steel press-formed plate and sections, it is mainly composed of:</p> <ul style="list-style-type: none"> - side panels made of stainless steel plate with polyzene guides housing on the belt's return; - sliding table made of stainless steel sections; - Intralox mesh belt with plugs; - draw head with anchorage flanges for mountings with self-aligning bearings and draw pinions made of suitable material; - return head with seats for mounting and bearing, mechanical device for taking up play; - standard loading and discharge hopper; - motorisation by means of motorized-gearbox; <p style="text-align: right;">./.</p>

ITEM N	Q.	DESCRIPTION
		<ul style="list-style-type: none"> - inferior casing for product collection; - swan neck in the loading side (standard length); - supporting frame; - tank Mod. V29G suitable to contain elevator and hopper for product loading inside water. Made of stainless steel press-formed plate, it will have the following features: <ul style="list-style-type: none"> • tank bottom towards the total discharge hatch; • DN40 water discharge valve; • water discharge pipe from the overflow; • stirrups for elevator's anchorage; • total discharge hatch. <p><u>Technical data</u></p> <p>Elevator dimensions: length 4.000 mm. width 500 mm.</p> <p>Tank dimensions: length 2.050 mm. width 1.200 mm. height 850 mm.</p> <p>Discharge height: 2.100 mm.</p> <p>Installed electrical power: 0,75 kW.</p> <p><i>(N.B.: Dimensions to be discussed according to the features of freezing tunnel)</i></p>
10	1	<p>ELECTRIC CONTROL PANEL</p> <p>CE regulation construction, with low tension controls, magnetothermic protections for each motor. Stainless steel box.</p>
10.1 OPT	1	<p>SUPPLEMENT TO THE ELECTRICAL PANEL (OPTIONAL)</p> <p>Supplement to the electrical panel of pos. 10 to control and command the optional machines of pos. 2, 3 and 9.</p>



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ITEM N	Q.	DESCRIPTION
<u>PRICE LIST</u>		
1	1	SUPPORTING FRAME EURO 550,00
4	1	MULTIPLE-BLADE SHELL-SCORER MOD. J1/1B EURO 31.600,00
5	1	SWAN INTRALOX NECKED ELEVATOR-BATCHER MOD. EL22C EURO 10.950,00
6	1	WORM SCREW PARBOILER MOD. SB/C EURO 19.150,00
7	1	SKIN SEPARATOR MOD. SP/P EURO 33.950,00
8	1	SORTING BELT MOD. NC/X/8/800 EURO 23.300,00
10	1	ELECTRIC CONTROL PANEL EURO 10.200,00

TOTAL PRICE OF THE LINE (OPTIONALS EXCLUDED)		EURO 129.700,00
 <u>OPTIONALS:</u>		
2 OPT	1	PVC STRAIGHT ELEVATOR MOD. EL20/3 (OPTIONAL) EURO 7.850,00
3 OPT	1	PRE-DRYER MOD. PSS/16 (OPTIONAL) EURO 30.650,00
9 OPT	1	SWAN NECKED ELEVATOR MOD. EL22C IN TANK MOD. V29G (OPTIONAL) EURO 17.600,00
10.1 OPT	1	SUPPLEMENT TO THE ELECTRICAL PANEL (OPTIONAL) EURO 2.700,00

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APPENDIX (ii)

Recipes
Chateau Clement, Pastry Course
Eric Chabot
La Châtaigneraie
07 600 Vals-Les-Bains

Soupe de Chataigne

Peel the chestnuts, first skin and the second one thanks to hot water.

Prepare the bouillon with 500 ml water, 50 g leeks, 50g carrots, 15g garlic and a little butter. Bring to the boil and simmer for 30 minutes. Strain.
In a pan, prepare 500g peeled chestnuts with milk then add stock. Cook until chestnuts are soft. Puree and add cream, salt and pepper.



Marrons Glaces

600g whole confits chestnuts
450g white fondant
125 ml chestnut syrup

Place whole chestnuts on a cake rack with a tray underneath. Place the fondant and syrup in a pan and heat until fondant is melted and mixed with the syrup. Coat the nuts letting the excess fondant mixture drop into the tray. Place in an oven at 200°C for 3-4 minutes to set the glaze.

Parfait Glace Aux Marrons (chestnut ice cream)

350 Pâte de marrons
400g Cream (whipped)
70g egg yolks (approx 4 eggs)
Sugar syrup made of 70g sugar and 70 ml water

Soften the pâte in a bowl over hot water. Beat the egg yolks until very pale (cream coloured). Add the sugar syrup and continue to beat. Fold in the whipped cream and pâte. Place into individual moulds and freeze. Chopped marrons confits can be added if preferred.

Biscuit Coulant a la Chataigne

Centre

200g Pâte de Marrons*
100g Sweetened chestnut puree
120g cream
50g butter

The Biscuit (pudding)

150g Pâte de Marrons*
50g butter
30g rice flour
30g ground almonds
2 egg yolks
2 egg whites beaten until stiff with 20g sugar.



Method

Centre

Mix all ingredients together and put into small moulds (~1 tablespoon, ice cube trays would be good) and freeze.

Le Biscuit (pudding)

Warm the pâte (just enough to soften the butter), add butter and mix.
Add rice flour and ground almonds
Add egg yolks
Fold in the beaten egg whites.

Spoon into ramekins until one third full. Take a frozen centre and place in the middle of the ramekin and then top up with pudding mixture to fully enclose the frozen centre.

Bake at 170oC of 12 minutes.

Turn out and serve with whipped cream.

*Thick sweetened chestnut puree.



Menu

Cousina

*Terrine de foie gras à la châtaigne avec mini brioche
et salade de jeunes pousses*

*Suprême de pintadeau rôti au Picodon d'ici et son jus
réduit à la châtaigne, gratin de potiron*

Assiette de Fromages

Tiramisu à la Châtaigne



SAS CASINO VALS LES BAINS - Avenue Claude Expilly - 07600 VALS LES BAINS - Tél. 04 75 94 65 85 - Fax 04 75 37 47 63

www.hotel-helvie.com - courriel@hotel-helvie.com

au capital de 480.000 € - R.C.S. AUBENAS B 378 218 309 - TVA Intracommunautaire FR 583 782 183 09 - APE 9200 Z