International
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Institute Inc

The George Alexander Foundation

ARTISAN CHOCOLATE PRODUCTION

Terri Mercieca

The George Alexander Foundation/
ISS Institute Fellowship

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Executive Summary

The history of chocolate is a long and complex journey, which started in the depths of the forests of Central America with a tree called the cacao, 'the chocolate tree', which was given its Latin name, *Theobroma cacao*, in 1753. This literally translates to 'food of the gods'.

The first people believed to have used cacao, or as we now call it—chocolate—were the ancient tribes of Mexico and Central America. Cacao was used by these tribes as currency and was consumed as a beverage by the societies' elite. Up until the 1840s chocolate was known as a beverage as opposed to the refined, smooth bars known today.

Chocolate production in Australia can be dated back to the 1800s, with MacRobertson's Chocolates being one of the most famous producers of chocolate at this time. Other companies with a long-standing history in Australia include Ernest Hillier and Haigh's Chocolates, which focussed on fine chocolate production in the 1900s.

The confectionery market today in Australia consists of three main areas, chocolate confectionery, sugar confectionery and gum. Currently chocolate makes up 62 per cent of the confectionery industry in sales terms, making it the largest market segment. There is a lean towards high quality, handcrafted chocolate, which is evident in companies such as Kennedy & Wilson Chocolates, Koko Black, Ganache Chocolates and Monsieur Truffe.

With the increasing numbers of independent chocolate establishments in Australia there is a higher demand for skilled labour. Accredited chocolate training in Australia is limited as it is currently available only though its incorporation into broader, long-term confectionery courses, as part of commercial cookery courses and through short courses at TAFEs and training organisations. Other alternative ways of training are through self-education, through experimentation, and an increasing amount of professional chocolate publications available. There are currently no accredited ongoing in-depth courses dedicated solely to chocolate making in Australia.

Mercieca's intention in undertaking the training at Oriol Balaguer in Barcelona came from a need to improve skills and learn advanced, current and new techniques in chocolate making, especially in relation to fine chocolates and pralines. The Fellowship also provided Mercieca with the opportunity to train with other chocolatiers, such as Damian Allsop, in England. This was to broaden the scope of skills and offer alternative perspectives on chocolate making.

The Fellowship was designed to address the skill and knowledge deficiencies in the field of chocolatiering through allowing Mercieca to:

- Establish a solid foundational skills base in a wide range of chocolate making techniques and apply these to organic chocolate making.
- Train in how to create innovative, contemporary and traditional chocolate designs in the areas of chocolate moulding, decoration, sculpting, and textures.
- Establish a scientific relationship with traditional chocolate making.
- Create and develop professional relationships in an Australian and international context.
- Update equipment knowledge and discover new technologies in chocolate making.
- Learn how to create and/or source tools specific to the trade, such as polycarbonate moulds, compression spray guns, enrobing machines.
- Specialise in teaching organic and conventional chocolate making skills.

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As a part of the Fellowship, Mercieca trained for three months in the chocolate studio of Oriol Balaguer in Barcelona, Spain. The training with Balaguer enabled the Fellow to practise daily new and innovative techniques in chocolate making. She visited Weiss chocolates in St Etienne, France, to learn about the processes of bean-to-bar production. She also visited chocolate expositions in Bruges, Belgium, and Paris, France. Mercieca undertook five days training with Damian Allsop in Marlow Bottom, England, and three days under the guidance of Bill McCarrick of Sir Hans Sloane's Chocolates, to further her knowledge of producing couvertures. The opportunity of training and visiting many places during her Fellowship enabled Mercieca to explore the chocolate industry in Europe, learn about crafting chocolate from bean to bar, and learn many new techniques in chocolate production.

One of Mercieca's main aims during her Fellowship was to acquire skills and knowledge that can help address the deficiencies within the chocolate industry in Australia. The Fellow's intention is to transfer skills and knowledge to other industry professionals through education and training.

Following on from the International Experience section the Fellow has outlined the ways to ensure that knowledge and skills are transferred:

- The implementation of accredited chocolate specific training in both the public and private education system.
- Holding discussions with industry professionals to gain an understanding of what is needed for our industry to grow, including education and gaining an international reputation.
- The formation of a Chocolatiers' Alliance. This would then create a forum where industry professionals, or people interested in joining the industry, can access information on education, training and qualifications, and also discuss industry trends, techniques and technologies.

Mercieca has also made recommendations following the Knowledge Transfer: Applying the Outcomes section for government bodies, professional associations, education and training providers, industry, business and the community, including:

- Appropriate government departments should now work together in creating and supporting accredited master artisan qualifications. These bodies should now provide funding for the education institutions to implement the necessary infrastructure to provide these qualifications. This will help young people to pursue chocolate making as a profession from a young age and provide school leaver's with the necessary skills to start a career in this field.
- With training being confined to a largely confectionary-based curriculum there needs to be a push from the industry for TAFE Institutes to provide adequate training for current and future industry professionals.
- Given the current environmental concerns, it is time now for businesses to behave responsibly, by looking at the entire supply chain from a holistic viewpoint; reviewing approaches to recycling, waste management, and using alternative energies, such as solar and wind, and looking at ways to minimise their impact on the environment. A prime example is packaging.
- An alliance between current and emerging chocolatiers will only strengthen the industry and develop skills in Australia to an internationally competitive level.

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- Nationally accredited training packages to be developed that are chocolate specific, covering both industrial and artisanal manufacturing, to allow for diversity and greater career choices for students. Private colleges could offer alternative sources of training to the TAFE system, with ongoing long-term training for industry professionals that is aimed at an apprenticeship level and achieving a master artisan qualification.
- The community, through the consumer bodies, to support companies that are local, and adopt fair-trade activities, and work only with organic material. Consumers should demand that companies be transparent about their ingredients, where they come from and how they are used.

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Abbreviations and Acronyms

3D	Three Dimensional
AQIS	Australian Quarantine and Inspection Service
CMA	Confectionery Manufacturers Association
DEEWR	Department of Education, Employment and Workplace Relations
DFAA	Department of Agriculture, Fisheries and Forestry
DFAT	Department of Foreign Affairs and Trade
DIIRD	Department of Innovation, Industry and Regional Development
HACCP	Hazard and Critical Control Points Australia
MOF	Meilleur Ouvrier de France (Master of France)
NASAA	The National Association for Sustainable Agriculture, Australia
ORGAA	Organic Retailers and Growers Association Australia
pH	Potentiometric hydrogen ion concentration. A measure of acidity or alkalinity in a solution

Definitions

Bean-to-bar	The bean-to-bar process is a common term describing the process of taking the cacao 'from the cacao bean to the chocolate bar' or the finished product.
Conching	The process of heating and mixing the chocolate to allow the volatile acids, fats and excess moisture content to be released and evaporate, therefore enhancing the overall flavour of the chocolate.
Couverture	Chocolate that has a very high percentage of cocoa. This chocolate is often used when tempering or enrobing. Couverture melts and tempers easily and is the preferred chocolate for tempering and enrobing confectionery.[1]
Design	Design is problem setting and problem solving. Design is a fundamental economic and business tool. It is embedded in every aspect of commerce and industry and adds high value to any service or product—in business, government, education and training, and the community in general. Reference: 'Sustainable Policies for a Dynamic Future', Carolynne Bourne AM, ISS Institute 2007.
Enrobing	The process that coats the cut ganache/praline with tempered chocolate to create a fine shell.
Fat bloom	Caused by the chocolate coming into contact with excessive heat or from improper tempering. The result is that the cocoa butter comes to the surface and because the unstable crystals have been reformed they set unevenly and make the chocolate look white and swirly.
Innovation	Creating and meeting new needs with new technical and design styles. (New realities of lifestyle). Reference: 'Sustainable Policies for a Dynamic Future', Carolynne Bourne AM, ISS Institute 2007.
Mycryo	Mycryo is a particular brand of cocoa butter. It is tempered cocoa butter in powdered form.
Osmosis	The movement of water across a semipermeable membrane from an area of high water potential to an area of low water potential.[2]
Panning	The process in which nuts, nougat, honeycomb or various other fillings are coated with chocolate in a rotating copper drum.
Polymorphic	The ability of a solid material to exist in more than one form or crystal structure.[3]

[1] www.about.com:candy

[2] http://en.wikipedia.org/wiki/Osmosis#Basic_explanation

[3] http://en.wikipedia.org/wiki/Polymorphism_%28materials_science%29

Definitions

Skill deficiency	A skill deficiency is where a demand for labour has not been recognised and training is unavailable in Australian education institutions. This arises where skills are acquired on-the-job, gleaned from published material or from working and/or studying overseas. Reference: 'Directory of Opportunities. Specialised Courses with Italy. Part 1: Veneto Region', ISS Institute, 1991. There may be individuals or individual firms that have these capabilities. However, individuals in the main do not share their capabilities, but rather keep the intellectual property to themselves. Over time these individuals retire and pass away. Firms likewise come and go.
Sugar bloom	Caused by the chocolate being exposed to humidity or water. The sugar crystals on the surface melt when in contact with this water, creating a rough surface that can result in a greyish dusty appearance.
Sustainability	The ISS Institute follows the United Nations for Non-Governmental Organisations' definition on sustainability: *"Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".* Reference: http://www.unngosustainability.org/CSD_Definitions%20SD.htm
Tempering/ pre-crystalising	The controlled crystallisation of cocoa butter to achieve shine, good snap, balance and texture.
Winnowing	To rid of undesirable parts. In this case, separating the shell or husk from the cocoa nib.

Acknowledgements

Terri Mercieca would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide her throughout the Fellowship program.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The International Specialised Skills Institute Inc is an independent, national organisation that for over two decades has worked with Australian governments, industry and education institutions to enable individuals to gain enhanced skills and experience in traditional trades, professions and leading-edge technologies.

At the heart of the Institute are our Fellows. Under the **Overseas Applied Research Fellowship Program** the Fellows travel overseas. Upon their return, they pass on what they have learnt by:

1. Preparing detailed reports to government departments, industry and education institutions.
2. Recommending improvements to accredited educational courses.
3. Offering training activities including workshops, conferences and forums.

Over 180 Australians have received Fellowships, across many industry sectors.

Recognised experts from overseas also conduct training activities and events. To date, 22 leaders in their field have shared their expertise in Australia.

According to Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010':

> Australia requires a highly skilled population to maintain and improve our economic position in the face of increasing global competition, and to have the skills to adapt to the introduction of new technology and rapid change.
>
> International and Australian research indicates we need a deeper level of skills than currently exists in the Australian labour market to lift productivity. We need a workforce in which more people have skills, but also multiple and higher level skills and qualifications. Deepening skills across all occupations is crucial to achieving long-term productivity growth. It also reflects the recent trend for jobs to become more complex and the consequent increased demand for higher level skills. This trend is projected to continue regardless of whether we experience strong or weak economic growth in the future. Future environmental challenges will also create demand for more sustainability related skills across a range of industries and occupations.[4]

In this context, the Institute works with Fellows, industry and government to identify specific skills in Australia that require enhancing, where accredited courses are not available through Australian higher education institutions or other Registered Training Organisations. The Fellows' overseas experience sees them broadening and deepening their own professional practice, which they then share with their peers, industry and government upon their return. This is the focus of the Institute's work.

For further information on our Fellows and our work see www.issinstitute.org.au.

[4] Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010', pp. 1-2 http://www.skillsaustralia.gov.au/PDFs_RTFs/WWF_strategy.pdf

Acknowledgements

Fellowship Sponsor: The George Alexander Foundation

The George Alexander Foundation supports activities in the following two areas:

Education

- to help talented young people achieve their full potential in any endeavour
- to support programs designed to improve educational, employment and leadership opportunities for disadvantaged young people

Environment & Conservation

- to develop partnerships with communities, government and the private sector to prevent irreversible damage to the environment and to encourage the maintenance of biodiversity

Terri Mercieca would like to thank the George Alexander Foundation for providing funding support for this Fellowship.

Supporters

Those Involved in the Fellowship Submission

- Peter Clack, National Communications Manager, Agri-Food Industry Skills Council
- Peter Wilson, Owner, Kennedy and Wilson Chocolates
- Kirsten Tibballs, Owner, Savour Chocolate and Patisserie School
- Arno Backes, Owner/Chocolatier, Ganache Chocolates
- Pam Vroland, Owner, Silvan Estate Raspberries
- Colin Garrett, Head of Food Technology, William Angliss Institute
- Mary Eckhardt, Owner, The Green Grocer
- John Grisold, Director, Chocolatier Pty Ltd
- Shane Hills, Director, Koko Black
- Maureen McKeon, Author, Crave: A Passion for Chocolate, Published by Murdock Books, 2007
- Emily Ross, Fellowship Supporter
- Barbara Wise, Report Writing Mentor

Australian Organisations Impacted by the Fellowship

Federal Government

- Austrade
- Australian Quarantine and Inspection Service (AQIS)
- Department of Agriculture, Fisheries and Forestry (DFAA)
- Department of Education, Employment and Workplace Relations (DEEWR), Australian Government
- Department of Foreign Affairs and Trade (DFAT)

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Victorian Government

- Agri-Food Industry Skills Council
- Department of Innovation, Industry and Regional Development (DIIRD)
- Local Councils – implementing food safety
- Small Business Victoria

Industry

- Australian Culinary Federation
- Confectionery Manufacturers Association
- Hazard and Critical Control Points (HACCP) Australia
- Organic Retailers and Growers Association Australia (ORGAA)
- The National Association for Sustainable Agriculture, Australia (NASAA), (Australia's leading organic certifier)

Professional Associations

- Confectionery Manufacturers Association (CMA)

Education and Training

- Box Hill Institute of TAFE
- Central Gippsland Institute of TAFE
- Gordon Institute of TAFE
- Holmesglen Institute of TAFE
- Private Education Institutions
- Registered Training Organisations
- Savour Chocolate and Patisserie School
- William Angliss Institute

Community

- Eltham East Primary School
- Fair trade and organic consumers
- Slow food supporters

About the Fellow

Name: Terri Mercieca

Qualifications

- Certificate III in Commercial Cookery, East Sydney TAFE, 1997
- Certificate IV in Training and Assessment, Ascet TAFE, 2006
- Food Safety Supervisor Certificate, Kangan Batman TAFE, 2007
- Chocolates and Pralines Training,Savour Chocolate and Patisserie School, 2003–2008

Terri Mercieca is a pastry chef and chocolatier. With her own venture, Fraise Sauvage, Mercieca has combined her training from some of Australia's finest food industry professionals with her own expertise in pastry and chocolate, to create fine chocolates and sweets from organic and fair-trade chocolate and ingredients.

Mercieca's philosophy in using organic and fair-trade ingredients is about ensuring that the process, the product and the people along the way have all been treated in a way that promotes quality, environmental sustainability and fairness for all.

Starting out as an apprentice chef in Sydney in 1995 the Fellow quickly developed a deep love of sweet culinary creations. After three years as an apprentice in some of Sydney's finer restaurant establishments Mercieca decided to solely focus her energies on desserts and pastries.

The move to Melbourne in 2003, to take on the role of Executive Pastry Chef at The Stokehouse in St Kilda, cemented her love for her profession as a pastry chef and reinforced her dedication to exploring and understanding the complex world of chocolate. She started her learning by reading about, and experimenting with chocolate. The first step was learning how to temper chocolate, a fundamental skill. To expand her skills in chocolate work, Mercieca enrolled at Savour Chocolate and Patisserie School in East Brunswick. This provided some answers and also validated her self-directed findings. It also showed her how complex and limitless the potentials of chocolate making as a profession could be.

In 2005 Mercieca moved to Healesville, in Victoria's Yarra Valley, to work at Kennedy and Wilson Chocolates, one of Australia's fine chocolate producers. This move enabled her to enhance her skills and refocus her career in this new direction. At Kennedy and Wilson, Mercieca learnt how to make chocolate, operate a conch machine, temper chocolate, both manually and with specialist machinery, and make various types of handmade chocolates. It also instilled in her a passion for chocolate excellence.

After finishing at Kennedy and Wilson, Mercieca returned to the city to expand her training into the field of education. Once she completed the Certificate IV in Workplace Training and Assessment, she started teaching commercial cookery with the intention of later using these skills to teach chocolate making and pastry cookery in the TAFE institutions and private cooking schools. She runs short courses in working with organic chocolate, and volunteers at Eltham East Primary School for chocolate demonstrations for year six projects each year.

Aims of the Fellowship Program

This Fellowship provided an opportunity for Mercieca to address the skill and knowledge deficiencies in the field of chocolatiering, allowing her to:

- Establish a solid foundational skills base in a wide range of chocolate making techniques and apply these to organic chocolate making.
- Learn how to create innovative, contemporary and traditional chocolate designs in the areas of chocolate moulding, decoration, sculpting, and textures.
- Establish a scientific relationship with traditional chocolate making.
- Create and develop professional relationships in an Australian and international context.
- Update equipment knowledge and discover new technologies in chocolate making.
- Learn how to create and/or source tools specific to the trade (eg polycarbonate moulds, compression spray guns, enrobing machines).
- Specialise in teaching organic and conventional chocolate making skills.

The Australian Context

Background

As already stated, the history of chocolate is a long and complex journey, which started in the depths of the forests of Central America with a tree called cacao, 'the chocolate tree', which was given its Latin name *Theobroma cacao* in 1753. This literally translates to 'food of the gods'.

The first people believed to have used cacao were the ancient cultures of Mexico and Central America, including the Mayan and Aztec tribes. Cacao was highly valued in these cultures as a beverage, used for medicinal purposes and also as currency. The chocolate of these times was an unrefined and bitter substance, significantly different to the refined product we know today.

Upon his ventures in Central America, Hernán Cortés was responsible for the introduction of cacao to Spain. Chocolate became the drink of the nobility and the aristocracy. This exclusiveness meant that chocolate was not introduced to the rest of Europe for some time. However, once it was unleashed it was unstoppable.

The introduction of the first true eating chocolate came in 1847 from the Fry's Chocolate company in England[5] and in 1879 Rudolph Lindt invented conching *"which vastly improves the quality of chocolate confectionery".*[6] The process of conching is designed to release volatile acids and excess moisture content from the chocolate. This rounds off the flavour of the chocolate and highlights the desirable characteristics of the cacao being conched.

The evolution of chocolate continued with the introduction of organic and fair-trade chocolate production. In 1994, Green and Blacks were the first company to produce an organic and fair-trade certified chocolate bar.[7] There are now increasing numbers of companies choosing to produce their own organic, fair-trade chocolates. These include companies such as Kaoka, Rapunzel, Endangered Species, Cocolo and Artisse.

Australia's Chocolate History

Chocolate production in Australia can be dated back to the 1800s. MacRobertson's Chocolate was one of the most famous producers of chocolate at this time. This was an innovative and well-marketed confectionery company that introduced to Australia some iconic chocolates, such as the Freddo Frog and Cherry Ripe.[8]

It is hard to define when chocolate in Australia started to become the more refined high quality product seen commonly in Europe. Ernest Hillier and Haigh's Chocolates were among the first to focus on fine chocolate production in the early 1900s.

The Emergence of Boutique Chocolates

In the 1980s a chocolate company called Chocolatier emerged, offering a unique chocolate experience.

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[5] SD Coe & MD Coe, *The True History of Chocolate,* 1996, p 243

[6] ibid, p 250

[7] C Off, *Bitter Chocolate,* 2006, p 283

[8] J Robertson, *MacRobertson the Chocolate King,* 2004

The Australian Context

They were creating beautiful chocolates that were handcrafted with a short shelf life of approximately four weeks. Most other chocolates contained a high percentage of alcohol and sugar to increase the shelf life. In the 22 years Chocolatier has been operating, their growth has been substantial, but their dedication to high quality chocolates has not changed, only the method by which it is produced. They have moved from small-scale handmade chocolates to large-scale highly technological manufacturing.

The next big improvement to the chocolate industry in Australia was the introduction of chocolate produced for its cocoa content. Kennedy and Wilson Chocolates entered the marketplace, the first Australian company to produce their own couverture with the percentage of cocoa mass clearly marketed and labelled in each type of chocolate they made. Peter Wilson, co-founder of Kennedy and Wilson, states on the website:

> *"We wanted to produce chocolate that tasted of chocolate, not just of sugar. So much chocolate is over-sweet. We took the alternative route, and produced chocolate that is high in cocoa mass, cocoa butter and cream".*[9]

Their intention was to produce chocolate that was about the quality of the ingredients and to produce something similar to chocolate available in Europe, from companies such as Valhrona Chocolate, yet unique to Australia.

In the past eight to ten years there has been a significant increase in the amount of boutique style chocolate establishments in Australia. These places are stylising themselves like coffee houses, but the focus is primarily on chocolate drinks and chocolate products. Koko Black is an excellent example of this trend. Their doors opened in 2003 in Royal Arcade, Bourke Street Mall, Melbourne. This is a very successful business with seven outlets now in operation throughout Melbourne, Canberra and Sydney. Shane Hill's philosophy is for his company, Koko Black, to stay true to traditional handcrafted chocolates and desserts by keeping machinery to a minimum. They also aim to provide an indulgent experience to their customers.

Melbourne artisan chocolate production is increasing at around 14 per cent per year according to Kirsten Tibballs from Savour Chocolate and Patisserie School. This is a significant increase in the industry in Australia.

Farm by Nature is an Australian company harvesting their own Australian grown cacao. This is being farmed in far north Queensland for experimentation and will eventually produce the first totally Australian grown cacao and completely Australian made chocolate. The only other company in the world known to do this is 'The Original Hawaiian Chocolate Factory' who asserts that this process assures *"total quality control from the fields to the final chocolate bars".*[10]

There is a limited amount of public information available on the number of chocolate producers in Australia and in each individual state and territory.

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[9] www.kennedyandwilson.com.au

[10] www.originalhawaiianchocolatefactory.com

The Australian Context

However, in the Confectionery Manufacturers of Australasia Industry Profile from 2004, they estimated that in 2002 there were 140 confectionary manufacturing firms Australia wide.[11] Whether this figure includes chocolate manufacturers is unclear.

The confectionery market consists of three main areas, chocolate confectionery, sugar confectionery and gum. Currently chocolate makes up 62 per cent of the confectionery industry in sales terms, making it the largest market segment.

The main players in the Australian confectionary industry include Cadbury, Nestle, and MasterFoods Australia New Zealand, totalling 70 per cent of the total sales for chocolate in Australia.[12]

The growing awareness of health and wellbeing in respect to chocolate consumption is leading to an increase in the demand for darker and higher quality chocolate. The issue of obesity and dental issues is driving some moves away from the sweeter, milkier products available. Chocolate has recently been labelled a super-food because of its high percentage of antioxidants and the health benefits this brings, for example that it may decrease the risk of cancer, heart attack and stroke.[13]

The Organic and Fair-trade Cocoa Trend

Fair trade essentially means that the commodity, at all its stages of production, is bought at a set, fair minimum price from the farmers. It also ensures better conditions for workers and that production is environmentally sustainable. This movement is in reaction to the widespread exploitation of cocoa farms and workers involved in conventional cocoa farming. The worst cases of this exploitation include the forced labour of children. Organics is a farming practice that produces food in its most natural form.

> *"Organic farming uses the earth's natural resources for sustainability. It emphasises appropriate land management and aims to ecologically achieve the balance between animal life, the natural environment and food crops. Organic farmers do not use pesticides, herbicides, genetically modified foods, growth promoters or hormones".*[14]

The current trend towards organics and fair-trade chocolate is leading to a significant change in the international chocolate industry. Big companies such as Callebaut, Cocoa Barry, Belcolade, are starting to produce organic chocolate and some fair-trade certified couvertures on a larger scale, therefore making it more accessible to industry and the consumer.

With the increased awareness of the consumer of ethical and environmental sustainability, it is not surprising that there is an emergence of organic and fair-trade chocolate in the Australian market. This can be seen with the introduction of Green and Black's Chocolate Recipes, and Artisse Chocolates to the supermarket shelves and the emergence of Australian companies, such as Loving Earth Chocolates and Cocoa Rhapsody.

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[11] Confectionery Manufacturers of Australasia, *Australian Confectionery Industry Profile,* 2004, 2009, www.candy.net.au

[12] Confectionery Manufacturers of Australasia, *Australian Confectionery Industry Profile,* 2009 www.candy.net.au

[13] http://www.superfoodsrxchocolate.com/superfood.php

[14] http://www.organicfood.com.au/Content_Common/pg-What-is-Organic.seo

A global mainstream impetus towards resolving the chocolate slave trade crisis is still far from resolution.

Some of the reasons for this are a lack of consumer consciousness to the actual problem of forced labour, the feeling of powerlessness in buying choice and the increased costs involved in buying ethically. There needs to be a push from local chocolate industry professionals to help with a solution and a demand that large companies be transparent about where they source their cacao beans and cacao products from. This helps the consumer to make an informed decision.

Loving Earth Chocolates are particularly interesting as they take the fair-trade concept beyond the standard required from certifying bodies. They focus their energies on producing chocolates that are not only minimally processed to retain the nutritional value, but that also sustain and empower the indigenous communities where the cacao and other products are sourced. The cooperative that Loving Earth Chocolates buy their ingredients from are all members of a fair-trade federation that has strict standards, and the producer must meet these standards to become a member.

The difference with this type of fair-trade product is that Loving Earth Chocolates pay higher than the standard fair-trade cacao commodity price. Loving Earth Chocolates challenge the consumer to question where the products they buy originate, and under what conditions. By clearly labelling their products with the exact places of origin of their cacao, sugars and other ingredients, Loving Earth Chocolates aim to set a standard for other companies and producers to do the same.

Future Trends

Where is chocolate going next? The trend towards healthier lifestyle choices is pushing chocolate companies to rethink how they will continue to be successful in the market and meet consumers' needs.

It is very likely that the highly exploitative conditions of cocoa farming will come under increasing levels of scrutiny. This will make it important for chocolate companies to align themselves ethically in this industry, to promote and support fair trade and to be transparent about the origins and processes behind the ingredients they use.

Another trend is Molecular Gastronomy, a style of cooking which explores the science behind the physical and chemical processes that occur in cooking. This enables the development of unusual and intriguing foods, which can help create individual flair and style. This trend will be useful in differentiating between competitors in the food industry.

The Available Training

With the increasing numbers of independent chocolate establishments in Australia there is a higher demand for skilled labour. Accredited chocolate training in Australia is limited as it is currently available only though its incorporation into broader, long-term confectionery courses, as part of commercial cookery courses and through short courses at TAFE institutes and private colleges. Other alternative ways of training are through self-education, through experimentation, and through the increasing amount of professional chocolate publications available. There are no accredited ongoing in-depth courses dedicated solely to chocolate making.

In Melbourne there are courses run at TAFE institutes specialising in confectionery, which include chocolate manufacture and chocolate work. There are schools that have outstanding facilities and an excellent array of chocolate and confectionery equipment.

It would be beneficial to the industry if a specific chocolate making curriculum were introduced into these TAFE programs to extend qualifications available to chocolate industry professionals. There is interest in the industry for more training to be available that is in-depth, practical and thorough; that will enable people wishing to pursue a career as a chocolatier to become qualified in this field.

Training at this stage seems to be contained within the confines of an education system where advanced chocolate training is inadequate and not very accessible for industry professionals. Therefore, workplace training is currently the predominant way skills are developed. For example Shane Hills, founder of Koko Black, prefers to train his staff in-house to ensure they are trained to suit his business needs. Hills has set up a thorough training schedule for his staff and this enables his business and his staff to grow in a direction that he wants to go. It also provides his employees with great knowledge and awareness of the product they are using within the company and skills they can carry with them in the future.

The drawback to this system is that the training is only available to the people who work there, and is limited to the specific skills particular to that business. This can leave people who move from job to job without the necessary written credentials they need to prove the skills they have gained.

Kirsten Tibballs is the founder and owner of Savour Chocolate and Patisserie School in Melbourne. Savour is the only solely focussed chocolate and patisserie school in the Asia Pacific.[15] On offer is a diverse range of courses, which aim to transfer her knowledge to other passionate, domestic and professional chefs in Australia.[16] These courses are among the best training available to industry professionals. Kirsten Tibballs and Paul Kennedy, the professors at Savour Chocolate and Patisserie School, have an international network of chocolate professionals that provide them with the means to constantly be in touch with the latest trends and access to new techniques and technologies. This enables the courses to be up-to-date and highly informative. However, as they are run only as short courses, this limits the amount of practice and development of the techniques learnt.

One major threat to the industry if quality long-term training is not made available to a wider audience is that it will become harder to break in to an international context with a ‘make do’ attitude. It is difficult to improve, evolve and be innovative when at a foundational level training is inadequate or unavailable.

It is significant that most leading artisan Australian chocolatiers have acquired their training and skills in Europe, where there is a higher level of chocolate training available. There is potential for professionals or people seeking chocolate making as a career to look overseas for training options. The possibility that these trainees will not return to improve the Australian industry skill level is a concern and could potentially hinder the growth of our developing chocolate culture.

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[15] Savour Chocolate and Patisserie School website, www.savourschool.com.au

[16] ibid

The Australian Context

Our chocolate industry needs up-to-date techniques and advanced ideas in order to compete in a strong international market and continue to grow as a viable industry within the Australian economy.

Benefits to Australia

One specific benefit to Australia for gaining overseas knowledge and skills is that education and training in chocolate making techniques can be passed on.

There is an interest in the introduction of new subjects being added to current training programs and updated industry-specific course materials.

The benefit to the chocolate industry and the Australian consumer is that these innovative methods in chocolate making will bring new levels of sophistication. It also caters to a growing niche in the Australian and world markets and will potentially create employment opportunities in this field.

If a cultural connection can be established between Australia and countries rich in chocolate making skills, it will generate further educational possibilities for industry professionals. This will enable a continual flow of new and innovative information and technical skills into the Australian Chocolate industry.

SWOT Analysis

Strengths

- Small manufacturers create more room for diversity and competition.
- Chocolate has a strong and enduring consumer demand.
- Demand for healthy, sustainable and fair products growing.
- Availability of high quality ingredients.
- Increasing information on the health benefits of chocolate.
- Demand for premium chocolate is high.

Weaknesses

- Exploitation of cocoa farms and workers.
- Size of the Australian market is small because of the population.
- Lack of skilled labour.
- Lack of training options.
- Difficulty securing a supply chain.
- Logistical and supply issues, such as disease in crops, petrol prices etc.
- Health problems related to chocolate over-consumption.

Opportunities

- Consumers are looking for increased meaning and ethical significance with regard to their products
- Minimally processed ingredients becoming more available.

The Australian Context

- Increased export potential to new markets, such as China, India, Japan.
- The chocolate industry is a growing and changing industry.
- A growing organic industry.
- Differentiation of chocolate to meet various tastes/textures related to international visitors and creating products for the tourism industry.
- Create chocolate products that are uniquely Australian.

Threats

- Potential saturation of the market.
- Challenge of remaining different to other competitors.
- International corporations opening and taking market share of local business.
- Being priced out of the market.
- Overseas competition.
- Import products priced lower than Australian made.

Identifying the Skills Deficiencies

The skill deficiencies relating to chocolate making in Australia can be seen in a number of areas. Most specific chocolate courses are short term. These courses are aimed at industry professionals expanding and improving their skills, for example TAFE teachers and pastry chefs. Also they are designed to appeal to domestic cooks and people in other professions looking to enter into the chocolate industry. Other long-term training is generally included in confectionery courses and is directed to industries such as large-scale food processing and manufacturing of chocolate confectionery.

There is at this time are no formal qualifications for the trade of chocolatier in Australia and highly stylised applications usually are encompassed within more general courses in food preparation.[17] The following are areas, where the skills and knowledge deficiencies lie within the Australian Chocolate Industry:

1. Advanced Chocolate Tempering Techniques

Chocolate tempering is an integral part of chocolate making. It is the controlled crystallisation of the chocolate to achieve shine, good snap, balance and texture. To have a complete understanding of the process it is important to study the following behaviours of the chocolate crystals at a molecular level:

- Learning different methods and techniques of tempering chocolate and how to apply the correct technique for specific situations.
- How to achieve high gloss finish on moulded chocolates and decorations.
- How to manipulate tempered chocolate into various shapes and designs for decorative purposes, for example flowers, cigars, shavings, plaques, chocolate boxes.
- Recognising and understanding the faults in tempered chocolate, for example why does tempered chocolate set with a glossy sheen in one area and matt and with marks in another area of the same piece?
- Identifying the causes of these faults and how to correct them.
- Creating textured surfaces and finishes on chocolates and selecting appropriate mediums to achieve innovative and traditional designs.

2. Chocolate Moulding and Fillings

Moulding is another fundamental skill in chocolate making. The design of the individual chocolates can be dependent on what mould is used; however, the chocolatier can use advanced moulding and decorating skills to create chocolates that stand out and show their own individual style. The skills required are as follows:

- Decorating moulds to create simple or dramatic visual results in finished chocolates.
- Print Moulding: How to create different prints into the shell of the chocolate.
- How to use cocoa butter and colour to finish chocolates. How to apply the cocoa butter to the moulds for high gloss and colour visuals. Selecting and operating specific tools for this technique.
- How to develop recipes for fillings using traditional or contemporary flavours and techniques.

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[17] Agri-Food Industry Skills Council

- Identifying the causes behind ganache fillings splitting, and how to correct this fault.
- Using chemistry to create chocolate fillings. Understanding Potentiometric hydrogen ion concentration (pH) levels, water activity, acid levels and fat components to create a balanced filling.

3. Truffle Making and Cut Pralines

One of the major roles of a chocolatier is creating individual chocolate pieces. This is where individual flair and style become evident. Chocolate truffles are made from a ganache (a mixture of cream and chocolate), coated in chocolate and then rolled in cocoa.

Cut pralines are chocolates that are made by setting a filling in a frame, it is then cut when it is set and dipped into the desired chocolate coating.

The skill areas required are:

- Develop different techniques and concepts for fillings and coatings that are traditional and contemporary, such as caramels, butter ganache fillings, nut pastes, and infusions. Selecting interesting flavour combinations and applying these to traditional chocolate making methods.
- Selecting innovative chocolate coatings for truffles and pralines to enhance texture and taste.
- Techniques in framing chocolate fillings for cutting and enrobing. How to pre-coat ganaches or pralines prior to dipping in tempered chocolate.
- How to operate an enrobing machine and how to operate a guitar for cutting pralines. Comparing hand-enrobing methods to machine operated methods.
- Mediums available to use for dipping chocolate fillings to create different textures and visual appeal.

4. Chocolate Decorations and Sculpting

Chocolate as an art form has a long history in Europe. Some chocolate sculptures can leave one to question if they really are made of chocolate. Decorations enhance the visual appeal of chocolates, cakes, tarts and desserts. The skills required are:

- How to operate latest technology in creating chocolate decorations.
- How to apply colour techniques and cocoa butter spraying methods.
- How to make innovative and traditional chocolate garnishes, such as cigars, chocolate curls, pulled chocolate shard.
- Manipulating chocolate to create chocolate sculptures, such as large chocolate cubes or chocolate installations.

5. Panning

Panning is the process in which nuts, nougat, honeycomb or various other fillings are coated with chocolate in a rotating copper drum, such as chocolate coated almonds:

- How to operate and understand the panning process.
- Select interiors appropriate for the panning process.
- Selecting and making suitable chocolate coatings for panning.

Identifying the Skills Deficiencies

6. Easter Egg Manufacture

Easter is the busiest time of year for a chocolate maker. The production of Easter eggs and other Easter goods are important to any chocolate business. Europe's chocolate specialists demonstrate a variety of skills in traditional and cutting-edge methods in Easter egg manufacture:

- How to make chocolate hollow eggs and figures using traditional and contemporary methods.
- How to decorate eggs using cocoa butter, colour and spray gun to design traditional and contemporary pieces.
- How to apply tempering, moulding and decorating skills to design and create innovative Easter showpieces.
- Developing scientific techniques in chocolate and pastry cookery to achieve optimum results.

7. Manufacturing Couverture[18]

The manufacture of couverture requires many areas of understanding. The skill areas include:

- Understanding the process the beans go through to produce cocoa butter, cocoa liquor and cocoa.
- Understanding what machinery and technologies are required to produce couverture.
- The differences between manufacturing organic chocolates and conventional chocolates.

[18] www.candy.about.com

The International Experience

Canelé Pâtisserie Chocolaterie

Location

- Singapore

Contacts

- Pang Kok Keong
- Raymond Yew

Objectives

- To visit a chocolate manufacturer in a warm climate with high humidity and to learn methods to manage chocolate in a climate where it is not suited.
- To observe a chocolate production facility in operation.

Outcome

The visit to Canelé Pâtisserie Chocolaterie allowed Mercieca to see first hand a chocolate production facility successfully operating in a warm and humid climate. Singapore is located just north of the Equator, hence the consistent heat and humidity, with humidity on average being about 75 per cent and an average temperature of 31 degrees Celsius.[19] This is not an ideal climate for chocolate production and storage, as chocolate work prefers much cooler conditions, a working temperature of about 23 degrees Celsius and a humidity of less than 50 per cent.

The Fellow learnt that to deal with the climate the chocolates are produced in a controlled environment. The chocolates are enrobed at an ambient, air-conditioned temperature of 20 degrees Celsius, and allowed to set overnight in the chocolate room at an ambient temperature of 16 degrees Celsius. These are then placed into trays in cardboard boxes, which are vacuum packed and kept in the fridge for one day, before being frozen for further storage. To defrost, the chocolates are moved from the freezer to the fridge for a day or two and then taken to the other chocolate display fridge, which is set to 13 degrees Celsius. The gradual changes in temperature and vacuum sealing are required to minimise any damage to the crystalline structure of the chocolate caused by humidity, air and temperature change. These changes de-stabilise the structure of the chocolate, and can cause defects such as a grainy, white appearance on the surface of the chocolate.

The same principles apply to the transportation of the product in this climate.

The chocolates at Canelé Pâtisserie Chocolaterie were mainly enrobed with a small selection of moulded chocolates and at the time of the visit, Easter eggs as well. Mercieca observed how to create unique designs on each enrobed chocolate by the use of structure sheets and fruit powders, and gained knowledge on how to operate an enrobing machine.

Decorating the enrobed chocolates can be enhanced with different mediums, such as structure sheets, bubble wrap, and acetate sheets. Structure sheets are made from thin plastic and come with different designs that are three dimensional (3D).

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[19] http://www.worldatlas.com/webimage/countrys/asia/sg.htm

By placing the structure sheet on the top or the bottom of the enrobed chocolate before the chocolate is set, the chocolate will take on the pattern of the structure sheet. This technique can also be applied with the use of clear acetate sheets and substances like fruit powder or fine powders such as gold dust.

Freshly enrobed chocolates that are setting. When the chocolate has set it will contract away from the structure sheet.

Canelé Pâtisserie Chocolaterie chocolate display.

Canelé Pâtisserie Chocolaterie's Easter eggs prior to packaging

Easter eggs: the finished product for sale

The Catalunya Region of Barcelona

Location

- Various chocolate shops and outlets in the Catalunya region of Barcelona, Spain, the 'La Mona de Pascua' tradition

Objectives

- Whilst in the in the Catalunya region of Barclelona, to view the range, variety and quality of chocolate available.
- To investigate the different ways of presenting and marketing the chocolate products.

Outcomes

In the Catalunya region of Spain there is a tradition at Easter time called La Mona de Pascua, which is a cake with decorated boiled eggs given to godchildren by their godparents on Easter Monday.

According to the Museu de la Xocolata in Barcelona:

> *"The mona is a symbol of Easter, the great Spring festivity which celebrates the rebirth of the vegetation and fertility powers. The renovation spirit makes the kids protagonists, wearing new clothes and being presented with a Mona. The symbols of life like bread, and fecundity, the egg, will be the components of the meals throughout these days".*[20]

The tradition has now become a massive industry for the chocolate professionals of Catalunya. In 2009, 625,000 units of La Mona were sold in Catalunya itself, in the form of traditional cakes and the more modern style of chocolate pieces.

A traditional La Mona

The first La Mona by Lluis Santapau in 1939

[20] A museo de xocolata

The International Experience

Lluis Santapau painting La Mona de Pascua, 1944

The first chocolate La Mona was created by Lluis Santapau in 1939, this sparked a new movement of Easter egg creativity, evident in the shop windows and displays throughout Barcelona.

How to make An Easter Egg: this step-by-step process was displayed on the wall of the shop Cacao Sampaka, Barrio Gotico, Barcelona.

Las Mones in a Bomboneria in Barcelona

Through her observation of the La Mona exhibits, Mercieca was able to identify the variety of skills that range from basic tempering and moulding to highly skilled manipulation of the chocolate and highly stylised artistic decoration.

During the Fellow's initial time in Barcelona, she had the opportunity view and taste the variety of chocolates available in the local chocolate boutiques. It was evident to Mercieca that Barcelona was home to cutting-edge chocolatiers who thought outside the square in terms of flavour and style.

One example of these master chocolatiers is Enric Rovira, possibly Barcelona's most innovative and avant-garde chocolatier. Rovira is renowned for his adventurous panning skills and conceptualisation of art with chocolate. He has created a range of panned items called 'la vuelta el mundo en chocolate' representing the five continents, each ingredient reflecting the nature and characteristics of each continent.

The African item has Ethiopian coffee with hazelnut praline paste, the Asian item has rice with dark chocolate, the American item has sunflower seeds with 70 per cent chocolate and salt, the Oceania item has macadamia nuts in milk chocolate, and the European item has almonds with crunchy chocolate.

An example of an artistic representation of La Mona by Enric Rovira

Enric Rovira's Shopfront

Another example can be found at Cacao Sampaka, a chocolate concept store with a chocolate cafe, that has a wide range of high quality chocolate bars made from origin beans and bean varieties such as criollo. Their enrobed bombones consist of flavours such as, curry, soy, parmesan, red wine vinegar and a variety of fresh herb infusions.

Some of Cacao Sampaka's enrobed chocolate range

Choco-Laté Festival

Location

- Bruges, Belgium

Objectives

- To gain knowledge of the chocolate industry in Belgium.
- To learn about the traditions and trends in the industry.

Outcomes

Belgium is world renowned for its chocolate. One mention of the word Belgian chocolate and many people go weak at the knees. Belgium is home to chocolate giants, Belcolade and Callebaut, with Belcolade now being the only chocolate company owned and operated in Belgium.

Bruges is one of the most famous chocolate towns in Belgium. There are approximately 40 different chocolatiers in this small touristic town. Around 20,000 inhabitants live in the historical centre and 255,000 in the metropolitan area.[21]

Given the large number of chocolatiers in Bruges the quality varies from exceptional modern and traditional chocolates to average and over-sweet. The Fellow aimed to visit most of the chocolate shops in Bruges to experience first hand this reputable Belgian chocolate. What she discovered is that most chocolate is aimed at tourists who tend to focus on quantity rather than quality.

There are but a small handful of chocolate makers pushing the envelope with their creations, while others seem to be relying on tradition and reputation to get them by.

The standout chocolates were from The Chocolate Line. The chocolatier, Dominique Personne creates interesting flavours for his filled and enrobed chocolates with flavours such as fried onion, curry and saffron, red wine vinegar caramel, wasabi and pea, a tequila shooter. He has a very good selection of traditionally flavoured chocolates as well.

During her stay in Bruges Mercieca attended the chocolate festival Choco-laté. This festival was aimed at showcasing Belgium's finest chocolates and chocolatiers, including some equipment and demonstrations.

A selction of interesting chocolates available from The Chocolate Line, Bruges

[21] http://en.wikipedia.org/wiki/Bruges

The International Experience

Mercieca observed the construction of the Belfry, a famous icon in Bruges being constructed from white chocolate by Stephan Leroux, Meilleur Ouvrier de France (MOF). This enabled the Fellow to gain a little insight into the skills required for sculpture making.

An amazing sculpture by Stephane Leroux MOF, of the Belfry, Bruges. He made it look effortless!

Chocolate World

Location

- Antwerpen, Belgium

Contact

- Ran Dergent

Objectives

- To gain knowledge of the latest technologies and the equipment currently available for tempering chocolate.
- To understand the processes involved in making a polycarbonate mould.

Outcomes

Chocolate World, Belgium, is the 'toyshop' for chocolate professionals. They have access to the latest technologies available for tempering machines, cooling tunnels and panning machines, and are considered to be cutting-edge practitioners in polycarbonate mould making.

Chocolate World is one of the leading companies manufacturing polycarbonate chocolate moulds, employing two designers who create the designs and the moulds. Mercieca was taken through the steps involved in the design and production of polycarbonate moulds. Polycarbonate is the hardest and toughest plastic currently available, which allows for the chocolate moulds to be very long lasting and durable. Polycarbonate mould making requires a lot of hands-on work.

The steps involved in the mould making are:

1. The design of the mould is either hand drawn or computer designed
2. The design is made into a stainless steel carving, which is done by hand in conjunction with computer software.
3. The convex part of the mould template is made next from the carving.
4. This is then placed in a mould base into which hot polycarbonate is injected and left for 20 to 40 minutes.
5. Finally the mould is cooled and then filed smooth by hand.

Varieties of moulds that are available from Chocolate World are all made from clear or coloured polycarbonate; the types of moulds including: chocolate moulds, hollow figures, industrial sized moulds, magnetic moulds for use with cocoa butter transfer sheets, and magnetic moulds that are used for spinning machines. Due to current trends in the industry for handmade products, Chocolate World is now creating moulds that give an artisanal effect, by having subtle variations in each mould cavity.

This onsite visit to Chocolate World allowed Mercieca to learn how to operate one of the latest automatic chocolate tempering machines and to view other technologies that complement them, such as cooling tunnels, automatic truffle rollers, enrobing lines and panning machines. The Fellow also gained an understanding of the efficiency and effectiveness that current technologies offer in the creation of high quality chocolate products.

Weiss Chocolate

Location

- Saint-Etienne, France

Contact

- Josiane Demare, Export Manager

Objectives

- To visit a high quality chocolate manufacturer that produces using the bean-to-bar method.
- To gain knowledge of the steps involved in the manufacture of high quality couverture, starting from selecting the cacao beans to the final production of the chocolate.

Outcomes

Weiss chocolate is located in Saint-Etienne, France. This family business has operated successfully for more than 100 years, and has provided direct local employment and associated economic benefits for Saint-Etienne over this time. Weiss is a quality driven company dedicated to producing very highly refined couvertures and chocolates. Their vision is to maintain a high standard from the selection of the beans through to the production of the chocolate itself.

During an onsite visit to Weiss Chocolates, Mercieca followed the processes involved in producing chocolate from bean-to-bar. These processes include roasting, winnowing, grinding, refining and conching. The Fellow also gained insight into the processes for selecting quality cacao beans, and developed an understanding of the machinery required to produce chocolate on an industrial scale. In particular, Mercieca learnt the importance of processing each bean by origin, as each cacao bean is different and requires different temperatures and times for processing.

The following steps were observed by the Fellow in the production of high quality couverture:

1. The selection of the cacao beans: from a range of samples of beans offered by cocoa traders, Weiss selects the beans to suit their flavour and quality standards.
2. The cacao bean delivery: cacao is received and Weiss check to ensure the quality is up to their standard by matching it to their samples and taste testing for acidity, bitterness and flavour profiles specific to the region. The cacao beans are then stored by origin.
3. The roasting of the beans: also done by origin and by following the traditional method in gas-heated air ‘globes’.[22] Beans are roasted according to origin, as each bean has a certain roasting temperature and time specific to the release of the desired flavour profiles. The beans are then sorted by machine to clear out any impurities, such as foreign objects, like small rocks, that have made their way into the sacks of beans.

[22] http://www.linkedin.com/companies/weiss-chocolate

4. Following roasting, the beans are winnowed, which involves separating the shell or husk from the cocoa nib. The husk is a paper-like skin that covers the nib. The winnowing process is done by breaking the beans after roasting so that the husk is mostly separated from the nib. The nib of the beans are then passed through a machine that blows air over the beans to remove the husk.
5. The nibs then pass through a pipe into a refining machine that crushes the nibs into a cocoa paste called cocoa mass. The paste is then placed into tanks according to each origin.
6. According to the particular recipe required, Weiss use a computerised system that selects the exact quantity of cocoa paste needed for the batch of chocolate being produced.
7. The pastes are then mixed in another tank and passed into a machine called a roller, which is for the pre-refining of chocolate masses with granular sugar and milk powders, when producing milk chocolate.
8. The next step is the refining process. The refining process involves the ingredients passing through a larger set of rollers that press the couverture into a finer paste.
9. The chocolate then undergoes conching for 12–24 hours, which is done to release the volatile acids in the cocoa liquor. This further refines the flavour of the chocolate.
10. The chocolate is then pumped into a tank specific to the type of chocolate that is being produced, such as chocolate with 70 per cent cocoa content or pure milk chocolate. It is kept liquid until it is ready to be tempered and used, to ensure efficiency in production.
11. This chocolate then goes on to be produced into such products as pralines, chocolate buttons, chocolate bars.

Weiss employ a team to control the production and to maintain maximum productivity and efficiency. The team routinely check and record the production times and monitor the output to ensure it is at a maximum capacity. Weiss also have a research and development department for the creation of new products and to ensure high quality and consistency in their products.

The layout of the factory is designed so it runs efficiently and has a high volume of productivity. The production processes for products such as couverture, praline pastes, panning, guitar, and bonbon fillings are all located around the exterior walls and then a central point is used for all the moulding, enrobing and packaging.

The Fellow observed other processes in operation including panning and cut pralines on an industrial scale. However, her observations of these additional processes were brief, and did not involve great detail.

Aula Chocovic

Location

- Vic, Spain

Contacts

- Núria Serria
- Ramon Morato

Objectives

- To gain knowledge of the ways to design and construct small chocolate sculptures and structures for special occasions.
- To learn how to decorate chocolate pieces using cocoa butter and colour.

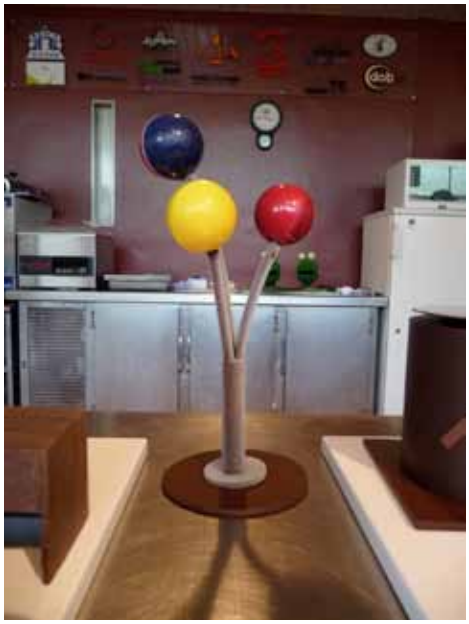
Outcomes

Mercieca was invited to attend one day of a two-day course at Aula Chocovic with Professor Ruben Álvarez. The course was designed to teach students how to transform chocolate into artistic chocolate pieces for special occasions, such as birthdays, weddings and other significant festivities outside of Easter. The Fellow attended the final day of the course and observed the completion of these pieces.

Aula Chocovic is one of the leading schools in Spain for professional chocolate and pastry training. The three main professors are Ramon Morato, Ruben Álvarez and Jose Ribe. These professors are regarded as leaders in their field. They focus their time on constantly updating and inventing new techniques and methods to produce the very best chocolates and pastries that they can.

Mercieca was able to witness first hand the cutting-edge designs and highly stylised chocolate pieces during her visit to the school and learnt how fundamental to this profession design is, as is the individual style of each chocolatier. Each piece taught in this workshop was well thought out, precisely measured, cut, then assembled and decorated. The result being that the chocolate constructions are high quality, exceptionally designed, interesting and extremely marketable.

Four leaf clovers and frogs – Ruben Álvarez 2009



Baby rattle – Ruben Álvarez 2009

Cut out letters in chocolate

Mini Houses – Ruben Álvarez 2009

Pit Bull – Ruben Álvarez 2009

Hearts and Christmas Tree – Ruben Álvarez 2009

Hearts – Ruben Álvarez 2009

Oriol Balaguer

Location

- Barcelona, Spain

Contact

- Marta Rams

Objectives

- To undertake practical workplace training in all aspects of high quality artisanal chocolate production covering tempering, moulding, ganaches, filled chocolates, and panning.
- To recognise faults in tempered chocolate, understanding the causes and how to correct them.
- To gain skills in using cocoa butter and colour to finish chocolates. To learn how to apply the cocoa butter to the moulds for high gloss and colour visuals, and how to operate specific tools for this technique.
- To learn aspects of making chocolate sculptures and Easter eggs (La Mona).

Outcomes

Mercieca's objective in undertaking the training at Oriol Balaguer in Barcelona came from a need to improve skills and learn new and current techniques in chocolate making, especially in relation to chocolates and pralines, called bombones in Spain.

The initial training in chocolate for the Fellow was to ensure the correct methods of tempering were being applied. This enabled Mercieca to gain great knowledge and practical experience in tempering and how to correct the errors made when tempering.

These methods included: table method, seeding method, use of Mycryo and tempering machines, and the tempering of cocoa butter.

The Table Method

To pre-cystallise using the table method, a quantity of chocolate is melted to 45 degrees Celsius to de-crystallise the chocolate. Two-thirds of the chocolate is poured onto a bench, preferably marble. Using a metal scraper and palette knife the chocolate is spread in a backward and forward motion over the table to cool the chocolate down to 27 degrees Celsius. The chocolate slightly thickens as it cools and once this temperature is reached, the mass is added to the reserved one third of the chocolate to heat it back to between 31 and 32 degrees Celsius. The chocolate is then tested on a small piece of paper in an ambient temperature of 23 degrees Celsius to establish whether the chocolate sets quickly and evenly, with good shine and snap.

During pre-crystallisation of the couverture, the unstable crystals melt, creating the right environment for stable crystals, called beta crystals, to be active and multiply. This allows the couverture to set quickly and evenly, with a good contraction. It also ensures that the chocolate will set with a good shine and snap.

The Seeding Method

This method of tempering consists of adding or seeding a number of already pre-crystallised couverture pieces or buttons (usually a third of the entire quantity) that have been melted to 45 degrees Celsius. The seeded pieces of couverture already have the correct crystalline structure, and adding them to the decrystallised couverture cools it to 31 to 32 degrees Celsius, allowing the right crystal structure to be attained. In this case the couverture is also tested to ensure correct tempering as mentioned above in the table method.

Tempering with Mycryo

Mycryo is tempered cocoa butter in powdered form and is obtained through the cryogenisation of cocoa butter (freezing at very low temperature).[23] It is very easy to use and allows for the very quick tempering of couvertures. A one per cent concentration is used in this method, that is ten grams of Mycryo per 1000 g of couverture. The downfall of this product is that it can make chocolate too liquid, as more cocoa butter is added to the product each time the chocolate is tempered. For this reason, the Mycryo method is particularly useful in the tempering of cocoa butter based paints, as the product is already liquid and this method will not affect the viscosity.

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[23] http://www.mycryo.com/callebaut/en/about.html

Tempering with Automatic Tempering Machines

The Fellow learnt how to operate automatic tempering machines used at Oriol Balaguer. Each machine held the chocolate in a tank at 45 degrees Celsius to decrystallise the couverture and then the chocolate is pumped through a refrigeration tube cooling the chocolate to 29 degrees Celsius for dark chocolate, 28 for milk, and 26 for white. Then the chocolate is reheated in the final part of the tube so that it comes out of the machine perfectly tempered. The temperatures of the chocolates when they come out are 31 for Dark and milk, and 30 for white.

Recognising Faults in Chocolate

If the chocolate is not tempered correctly there can be visible defects, known as bloom, that make the chocolate less appealing visually and texturally. Blooming occurs when the chocolate is out of temper, resulting in grey, dusty and sometimes white appearance on the surface of the chocolate. These defects can be categorised in two ways:

- *Sugar bloom.* This is caused by the chocolate being exposed to humidity or water, the sugar crystals on the surface melt when in contact with this water, creating a rough surface that can result in a greyish dusty appearance.
- *Fat bloom.* This is caused by the chocolate coming into contact with excessive heat or from improper tempering, the result is that the cocoa butter comes to the surface and because the unstable crystals have been re-formed they set unevenly and make the chocolate look white and swirly.

Making Bombones at Oriol Balaguer

Mercieca's participation in everyday chocolate production enabled her to observe and practise the many steps involved in making filled chocolates:

1. Pre-crystallising couvertures.
2. Making and pre-crystallising cocoa butter for spraying.
3. Preparing spraying room and moulds for spraying.
4. Spraying of chocolate moulds with cocoa butter-based paints to give a brilliant shine to the surface of the chocolate.
5. Scraping moulds free of any excess chocolate and cocoa butter.
6. Moulding and Setting of shells.
7. Making fillings such as Ganaches, Pralines and Caramels.
8. Bringing fillings to the correct temperatures.
9. Filling chocolate shells with prepared fillings.
10. Allowing crystallisation of the filling for 24 hours at a temperature of 15 degrees Celsius.
11. Closing the chocolates with pre-crystallised couverture.
12. De-moulding chocolates.
13. Packaging chocolates.

The variety of skills involved in the production are outlined below.

Spraying of Chocolate Using an Air Compressor and Air Gun

Visual appeal is one important factor in the production of filled chocolates. This helps a chocolatier to portray their individual style. The Use of cocoa butter-based paints/sprays has an important role to play in chocolate work, and is useful in many facets of chocolate production. It gives a brilliant shine to the shells of filled chocolates and chocolate bars and also highlights the details on sculptures and Easter eggs.

The Fellow gained knowledge and experience in the preparation of cocoa butter-based sprays and in spraying chocolate moulds and sculptures.

To make paint suitable for spraying, cocoa butter, chocolate and colour (if desired) are combined. The cocoa butter is heated to no more than 35 degrees Celsuis and then the chocolate is mixed in, along with colour if it is being used. It is advisable to use a fat-soluble colouring, as this incorporates well with the cocoa butter. The ingredients are whisked together and, if colour is used, an electric hand blender can be used to make sure that all ingredients are fully mixed and there are no lumps of colour that have not dissolved.

A Recipe for Milk Chocolate Spray

- 1 kg cocoa butter
- 1 kg milk chocolate

Method

- Melt cocoa butter to 35 degrees Celsius and add melted milk chocolate. Mix well.
- Before spraying it is important to temper the paint. Mercieca observed two methods of tempering the cocoa butter sprays at Oriol Balaguer:

Tempering with Mycryo

- To temper paints, the mixture is heated to between 35 and 37 degrees Celsius and a one per cent concentration (of total weight) of Mycryo is added and mixed in well.
- The paint will be at the ideal painting temperature at 32 to 34 degrees Celsius.

Tempering by Hand

- To temper by hand it is necessary to apply the same rules as tempering with Mycryo.
- Heat paint to 45 degrees Celsius and then cool two thirds of the warm paint down to 26 degrees Celsius in a shallow flat container while moving the mixture back and forth with a metal scraper.
- It is possible to do this on a marble slab; however, it is very liquid and can be quite messy.
- When the paint reaches 26 or 27 degrees Celsius add to the other one third of warm paint. The ideal temperature for painting is 31 or 32 degrees Celsius.

Whichever method is used, it is essential to test to see if the paint is tempered. If the chocolate is out of temper all the shells will bloom.

Spraying Cocoa Butter

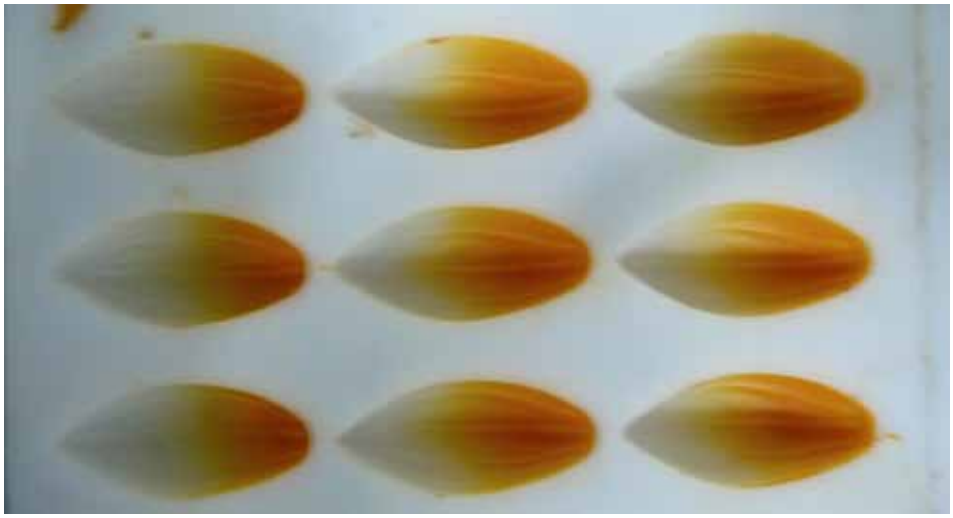
Techniques for spraying cocoa butter can vary depending on the desired effect, colour and viscosity of the paint. The Fellow gained experience in using and understanding the equipment and the methods of spraying used at Oriol Balaguer.

The Equipment Required

- Air compressor
- Hose
- Gravity fed pistol

The Fellow observed and practiced the following steps in spraying:

1. Place moulds on a tray and lean the tray vertically against a wall.
2. Temper paint.
3. Connect pistol to the compressor hose.
4. Fill pistol with paint.
5. Stand about one metre away from the moulds and stand even, with legs shoulder width apart. It is important to keep body relaxed and steady.
6. Aim the pistol at the moulds making sure to keep hand in front of and in the middle of the body.
7. Using a rocking motion and squeezing the trigger, move from one side of the moulds to the other taking care to keep the hand straight and the motion smooth and even. This is important to ensure an even coating of paint on the moulds.
8. Once painted, place tray in the cool-room at 15 degrees Celsius to crystallise.



An example of a mould sprayed with tempered cocoa butter and colour

Moulding

Mercieca spent a significant number of hours moulding chocolates during her training at Oriol Balaguer. All of the moulding done here was by hand with either hand tempered chocolate or using the continuous chocolate tempering machines. The technique of moulding was done using a ladle, metal scraper (similar to a paint scraper), and polycarbonate moulds.

The Fellow observed and practiced the following steps in moulding:

1. Fill moulds with chocolate covering all the cavities, not to allow chocolate to flow over the edges of the moulds
2. Tap the mould to release any excess air bubbles
3. Turn the mould upside down and let the excess chocolate flow out into a bowl
4. Scrape the excess chocolate off the mould while the mould is upside down, being careful to keep the mould horizontal
5. Place back the right way up, back on a tray
6. Leave to set in coolroom at four degrees for 20 minutes
7. Place in coolroom at 15 degrees Celsius until ready to fill.

Making Ganache and Praline Fillings for Moulded Chocolates

The Fellow learnt and practised making fillings for moulded chocolates during her Fellowship at Oriol Balaguer. Mercieca gained skills in emulsification, infusions, pralines, tempering pralines, and proper crystallisation of the fillings.

Emulsification is a very key skill in the production of ganaches. It is essential to create a good emulsification, to ensure a filling that is smooth in texture, sets evenly, melts in the mouth, doesn't separate, and maintains its shelf life. Mercieca learnt how to correctly emulsify ganaches by hand and with the use of a hand blender.

The Fellow observed and practiced the following steps in preparing a ganache:

1. Measure ingredients accurately.
2. Bring the cream to the boil with the sugar (glucose, inverted sugar) and flavour.
3. Pour over the chocolate and allow to stand for a minute.
4. Using a rubber spatula, start the emulsification in the centre if the mix.
5. Working in one direction, with small continuous circular stirring, mix until the ganache starts to homogenise.
6. Once the ganache is around 80 per cent homogenous, it is possible to use an electric hand blender to complete the emulsification or continue by hand.
7. When the ganache is completely emulsified, it should look smooth, have a sheen and have a thicker consistency.
8. Allow ganache to cool to around 35 degrees Celsius before piping into chocolate shells.
9. Once piped into shells, allow them to crystallise in the cool-room at 15 degrees Celsius for a minimum of 12 hours.

When making praline fillings, it is important that the cocoa butter or chocolate being added is tempered, so that the praline can crystallise fully. If it is improperly tempered it is possible for fat from the filling to migrate to the shell and cause a fat bloom on the finished chocolate.

This hands-on training enabled the Fellow to enhance her skills in making fillings for moulded chocolates, and to gain a clearer understanding of the techniques of preparing ganaches and pralines.

Making Sculptures

Oriol Balaguer is famous for his sculptures. Mercieca noticed that there seemed to be a trend in Spain for chocolate sculptures to be ordered instead of cakes for weddings or special occasions. Mercieca assisted in producing two large sculptures during her time in the chocolate studio, thus enabling her to gain an understanding of the steps and skills required in this process.

Two examples of the large chocolate sculptures made at Oriol Balaguer

Another two examples of the sculptures from Oriol Balaguer

Panning

One skill that Mercieca was particularly keen to learn was how to make panned products, such as chocolate-coated nuts and dried fruits. The Fellow was able to learn this skill whilst training at Oriol Balaguer.

Many factors are important when panning, including the rotation of the drum, the amount and the speed of cool air being blown over the confections. Mercieca learnt that when panning, the ingredient is slowly coated in layers of chocolate. As the warm chocolate is added to the panning machine, the airflow and the rotation temper the chocolate around the ingredient, ultimately resulting in a crunchy coating of tempered chocolate.

The shine resulting on the final product comes from the constant rotation, so that the pieces being coated keep knocking into each other. This knocking creates the sheen, much like river pebbles being formed and polished.

Some examples of ingredients the Fellow learnt to pan are roasted hazelnuts, popping candy, feuilletine, and candied lemon rind. She also learnt how to pan by hand.

La Mona de Pascua

As mentioned earlier La Mona de Pascua is a strong tradition in Catalunya, Spain, at Easter time. Oriol Balaguer is very famous in Barcelona for his cutting-edge designs in chocolate sculpting and his La Mona. Each year they produce a range of Easter eggs or egg-like structures for the season.

Las Mones on display in Oriol Balaguer's shop

There are a variety of skills utilised to produce a La Mona. During her time at Oriol Balaguer, Mercieca was given the opportunity to design and make a La Mona of her own.

The International Experience

Some examples of Oriol Balaguer's Las Mones

Mercieca's own La Mona being constructed. Half egg moulded in white chocolate

Pieces of La Mona waiting to be assembled

The International Experience

The front face of the egg. The hole has been cut prior to setting.

Egg made red from using cocoa butter and red colour, then sprayed into moulds, set and then moulded with dark chocolate

Pieces of La Mona awaiting assembly

Joining of the parts of the Easter egg done by slightly melting the edges and sticking together, then allowing to set.

The Egg setting on the base. Chocolate is piped onto the base and then allowed to set slightly. The egg is then placed on and supports used to hold in position.

The small eggs are placed inside the larger egg, one by one. Sticking with tempered chocolate and allowing to set before sticking the next egg.

The International Experience

Assembled and getting ready for painting. Chocolate egg is placed in coolroom or freezer to get very cold before spraying. This helps achieve a velvet effect once painted.

The first coat of cocoa butter spray complete. Getting ready for the next.

The final piece, La Mona De Pascua called 'escapando'

Xetoxi xocolates

Location

- Barcelona, Spain

Contact

- Xènia Creus Gisper

Objectives

- To undertake further practical experience in chocolate making.
- To see a different perspective in chocolate making and a different interpretation of skills.

Outcomes

Mercieca undertook two days practical training at Xetoxi xocolates in Barcelona. Xetoxi xocolates is a small wholesale operation, owned and operated by chocolatier Xènia Creus Gisper, that focuses on producing fine high quality artisanal chocolates.

During her time at Xetoxi xocolates, the Fellow gained a different perspective on chocolate making. Due to the size of the operation, Mercieca observed how a smaller producer operates and adapts their skill set to suit the size of the company. The fact that everything at Xetoxi xocolates was hand made enabled Mercieca to practise a variety of skills.

The tempering method used was the table method, however, the difference in the working temperature of the chocolate was very noticeable. The temperatures used to work with chocolate at Xetoxi xocolates were 31 degrees centigrade for dark chocolate, 29 degrees Celsius for milk, and 28 degrees Celsius for white, as they preferred to work with chocolate which is one degree Celsius cooler than the upper limit of where you can take it without de-crystallising it. The purpose in this case was to work safely within the parameters of the temperature zones where the beta crystal has the correct crystal structure, thus minimising the risk of decrystallisation.

Generally speaking there is a range of temperatures one can work with, with each type of chocolate. While this does depend on manufacturers specifications and personal preference, the chocolates generally need to be worked with within the temperature ranges of 27 to 29 degrees Celsius for white, 28 to 30 for milk, and 30 to 32 for dark chocoloate.

Another difference between Oriol Balaguer and Xetoxi xocolates, observed by the Fellow, was the setting of the moulded chocolates. At Xetoxi xocolates everything is allowed to crystallise at between 15 and 17 degrees Celsius, which allows a slow crystallisation and gives time for the chocolate to take the finish of the surface on which it is set. Xetoxi xocolates prefer not to set bombones in the fridge at four degrees Celsius to lessen the chocolate's exposure to humidity, which can cause a shorter shelf life and create mould in the chocolate after a period of time.

Mercieca also gained further knowledge in moulding using a different automatic tempering machine when she moulded chocolates and made chocolate bars, figures and half domes for the creation of Las Mones de Pascua.

Damian Allsop Chocolates

Location

- Marlow Bottom, UK

Contacts

- Damian Allsop
- Anna Hernández Piferrer

Objectives

- To gain further skills in tempering chocolate, making pralines, enrobing, and panning.
- To further develop a greater understanding of the science of chocolate and chocolate making.

Outcomes

The Fellow undertook five days practical training at Damian Allsop's chocolate studio in Marlow Bottom, England. Allsop's speciality with chocolates lies in his concept of creating water-based ganaches. Allsop has created a formula that unites water with chocolate to create chocolates that honour the pure flavour of chocolate and the other ingredients paired with it. Most ganaches are made using cream as the principle liquid and flavour carrier; however, Allsop believes that by using cream in this way, you lose a lot of the flavour of the chocolate. By replacing cream with water in his recipes, Allsop's intention is to capture this essential chocolate flavour in its purest form. The techniques he uses to create the water-based ganaches are currently a protected trade secret.

During her time with Allsop, Mercieca learnt the importance of understanding the purpose of each ingredient and its contribution to the recipes used. This enabled the Fellow to think laterally about creating recipes and to use formulas as opposed to trial and error experimentation. Understanding the fat, sugar, solids, water activity, and ph level of a recipe, and the effects of these different levels, enables a chocolatier to create consistent products that have a good shelf life.

As stated earlier, one of the key skills in chocolate work is tempering, or the pre-crystallisation of the couverture. Mercieca gained a clearer understanding of what is actually happening when you temper chocolate. Couvertures that are of a very high quality and have been conched for a long time, usually around 72 hours, need to be de-crystallised for longer periods of time, a minimum of five hours, to allow for full decrystallisation.

According to Allsop, tempering is the controlled crystallisation of cocoa butter. Cocoa butter is polymorphic and this means it can form different sized crystals. There are three different fatty acids, each with their own melting and setting temperatures. This gives the six forms the cocoa butter can take when crystallising. All crystals can be stable or unstable. Of the six crystal forms in couverture chocolate, the crystal that is stable is known as the beta crystal. There are various ways of achieving the stable crystal.

During pre-crystallisation, once the chocolate has been melted to above 45 degrees Celsius all the crystal forms have been de-crystallised. As the chocolate starts to cool, depending on the temperature, stable and unstable crystal structures start to form. Different crystals form when movement ceases. Ideally, the factors of temperature, time and movement allow one to create the right environment for the desired crystal to form.

The temperature zone where the beta crystal can exist varies, but is predominantly 28–29 degrees Celsius for semi-stable, and 31–32 for fully stability. If there are too many crystals, the temperature can be raised up to a final working temperature of 34.5 degrees Celsius. In particular, when moulding, it is important to put crystallised chocolate in the desired form or mould as quickly as possible because excessive movement allows for greater possibility of unstable crystals forming.

Over-crystallisation occurs when there are too many active beta crystals. If this happens the chocolate will become very thick and difficult to work with. Should this happen, the Fellow learnt that it is possible to heat the chocolate to melt some of the excess crystals and then be able to continue to work with it. Tempered chocolate is the right amount of the right crystal.

The Fellow learnt that there are six important factors in the production of making a quality chocolate:

1. Flavour of the chocolate.
2. Control—temperature and humidity.
3. Decrystallisation zone—hot cupboard 45 to 50 degrees Celsius.
4. Semi-malleable zone—22 to 24 degrees Celsius.
5. Complete crystallisation—18 degrees Celsius.
6. Store/service—12 to 14 degrees Celsius.

The Fellow also became aware of the following two factors that ensure a quality product:

1. Preservation at minus 18 degrees Celsius prevents water movement.
2. 22 degrees Celsius is the ideal eating temperature.

It is very important to keep temperature differences to a minimum when making and handling chocolates, from moulding to cooling and setting, and on through to displaying and selling the product. The Fellow learnt that condensation occurs when there is a 7 degrees Celsius, or greater, temperature difference between the chocolate and the surrounding temperature. A way to prevent this condensation occurring when changing the temperature of the chocolate, such as when defrosting a frozen chocolate, is to leave it wrapped in cling film or in a cloth until the chocolate has reached the ambient temperature of the room before exposing it to air.

Other aspects of chocolate making that the Fellow observed and practised with Allsop and the team were cut pralines and enrobing. Mercieca learnt that when dealing with cut pralines it is necessary to allow enough time for crystallisation to occur in the ganaches. Ideally, this would occur over two days. On the first day, the ganache is made and framed, then allowed to set at an ambient temperature of 18 degrees Celsius for one day.

The following day the framed ganache is pre-coated on the bottom to ensure it does not stick to the enrobing belt. Next it is cut with a guitar cutter to the desired size and spread out over a tray, making space between each chocolate. This is then left at the same temperature overnight to dry the exterior of the chocolate slightly so that when enrobing later the ganache will coat easily. Chocolate will only stick to a dry surface. If the chocolate is wet, water will be trapped inside and produce an environment for bacterial proliferation. Just before enrobing, it is desirable to bring the ganache closer to an ambient room temperature of approximately 22 degrees Celsius so that, when coating, the interiors are not too cold and allow the chocolate to set around the ganache evenly.

When using an enrober there are a number of things to watch out for:

- The chocolate is pre-crystallised correctly and has the correct viscosity.
- The ganache is brought to approximately 22 degrees Celsius for ease in enrobing.
- The enrobing belt is clean.
- There is a good, consistent stream of chocolate flowing, forming a curtain for the chocolates to pass through to ensure even coating.
- The enrobing belt passed through the chocolate enough so that the bottoms of the chocolates are coated.
- The fan, which blows excess chocolate off the top, is set so that not too much or too little chocolate is blown off. Ideally the coating of the chocolate should be between one and one-and-a-half millimetres.

Mercieca learnt that it is important to maintain a consistent thickness in the coating around the ganache and also in moulded chocolates for preservation reasons. If the shell is too thick it will be unpleasant to eat and if it is too thin it can cause osmosis—the humidity in the atmosphere will be drawn to the chocolate or visa-versa—therefore lowering the shelf life and allowing for spoilage, such as mould, to happen at a faster rate.

Overall, Mercieca's experience with Damian Allsop and the team enabled her to consolidate her learning's in Spain and France and further expand her skills and knowledge in chocolate making.

Damian Allsop's H20 Chocolate Selection

Sir Hans Sloane Chocolates

Location

- London, UK

Contact

- Bill McCarrick, Founder, Sir Hans Sloane Chocolates

Objectives

- To gain experience in conching couverture.
- To learn what is required to produce a high quality couverture.
- To practise tempering and operating automatic tempering machines.

Outcomes

Sir Hans Sloane Chocolates, led by renowned pastry chef and chocolatier Bill McCarrick, was the first artisanal chocolate company in England to conch their own chocolate in-house. From 1987 to 1990, McCarrick was the pastry chef at Menzies at the Rialto and at the Hyatt, on Collins in Melbourne, and was the pastry chef at Harrods, London.

Sir Hans Sloane Chocolates product is sourced from single farms and estates and then is refined by tailoring the process to suit each particular variety of cocoa; therefore ensuring the best flavour from each harvest is honed and developed.

The type of machine used at Sir Hans Sloane Chocolates to produce the couverture is called a Conch Refiner, and it combines the two final stages of chocolate production. The word conch is derived from the French word ‘conche’, meaning shell.

Refining is the final grinding that smooths out the texture of the chocolate by heating the chocolate through friction, and having the chocolate pass through the grinders against the side of the conch. The particle size of the chocolate is reduced so that no graininess can be felt in the mouth. The particle size at Sir Hans Sloane Chocolates is refined to around 22 microns. The intense mixing ensures each solid particle is evenly coated with cocoa butter, thus developing the flavour more fully.

Conching is the process of heating and mixing the chocolate to allow the volatile acids, fats and excess moisture content to be released and evaporate, therefore enhancing the overall flavour of the chocolate.

Mercieca learnt that conching, without the addition of extra cocoa butter, allows the flavour of the cocoa liquor to dominate in the couverture, giving a deeper and fuller, more intense flavour to the chocolate produced.

While the addition of extra cocoa butter during the conching dilutes the characteristics of the bean and creates a much more generic couverture. For this reason, when designing a chocolate of high quality, with the aim of keeping the distinctive flavours of the cocoa, only minimal cocoa butter needs to be added to the recipe.

To achieve a caramel flavour in chocolate, the Fellow was advised to conch at a high temperature initially, so that the sugars in the chocolate caramalise. This caramelisation of the sugars will give butterscotch, caramel, and toffee characteristics to the couverture. However, care should be taken in this process because, if conched too high, the sugars can burn leaving an over-caramalised, bitter flavour in the final product.

During Mercieca's stage at Sir Hans Sloane Chocolates, she attended a chocolate tasting called '50 Degrees of Chocolate' hosted by Bill McCarrick at the Academy of Chocolate in London. The evening focused on the percentage of cocoa mass in the chocolate from 35 per cent through to 85 per cent cocoa solids.

The display of Sir Hans Sloane at the Academy of Chocolate

The '50 Degrees of Chocolate': ranging from milk, 35 per cent, to dark, 85 per cent.

The Fellow was able to continue to practice her skills of tempering by table method and moulding using automatic tempering machines. This enabled her to further consolidate the skills she gained during the European component of her Fellowship.

Spreading the chocolate on the bench to cool for tempering

Tempering the chocolate

Chocolate Professional Trade Show

Location

- Finale Internationale du World Chocolate Masters (World Chocolate Masters Competition) at the Salon du Chocolat Professionnel (Chocolate Professional Trade Show), Paris

Objectives

- To gain current industry knowledge on trends, equipment, tempering machinery and ingredients, from producers, suppliers, and artisans.
- To see first hand what is involved in the competitive realm of the chocolate industry.
- To gain an understanding of the preparation that is involved and the skill set required to compete on an international level.

Outcomes

Every two years there is the Salon du Chocolat Professionnel (Chocolate Professional Trade Show), an industry expo where the latest cutting-edge techniques, equipment and products are showcased. The Fellow gained insight into the current trends, products, equipment and ingredients that are currently available.

Whilst most of the chocolate industry is an industrial and commercial affair, small artisanal producers influence trends in the industry in many ways.

As stated earlier, due to consumer demand for artisanal products, companies are now focusing attention on making equipment that still gives a handmade effect, such as the moulds from Chocolate World.

Another example of the impact of smaller artisanal producers on the larger chocolate scene is the trend of specialised companies producing quality handmade garnishes for business that are time poor, spatially challenged or have a lack of technical know-how. This gives them accessibility to these kind of designs and products, enabling the business purchasing these garnishes to have consistency in their product and to achieve a standard that may have been otherwise impossible, but which can mimic the styles of artisanal chocolatiers.

The Fellow also became aware of the trend of companies, such as Belcolade, Callebaut and Cocoa Barry, to make tailor-made couvertures to chocolatiers' specifications, thus allowing for individual style amongst chocolate and pastry professionals.

By attending the Salon du Chocolat Professionnel, Mercieca was able to observe the World Chocolate Masters Competition[24] and view the expertise of each individual participant. This competition enables a group 20 of the world's best chocolatiers to compete for the title of 'World Chocolate Master.'

Their dedication to the craft is obvious given the rigorous criteria required to first qualify for the national selections and then to win this competition. Each contestant invests approximately two years for a competition of this stature: the first year preparing for the national selections and then the following year preparing for the World Chocolate Masters.

Each participant needed to complete the following products in each category highlighting the theme 'Haute Couture':

- Sculpture: minimum height one metre, maximum height two metres
- Enrobed Chocolate
- Moulded Chocolate
- Plated Dessert
- Gateau
- Decorated Hat

The competition was scheduled over three days with two groups competing in selected time slots. Each category was given an allocated time frame for the piece to be completed. The particular piece is then judged by a jury of 22 master chocolatiers each one representing a participating country.

The scores of each category are tallied and the contestant with the highest score wins the title. The winner of 2009 World Chocolate Master was Shigeo Hirai a master chef from Japan.

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[24] www.worldchocolatemasters.com

The International Experience

The competition space of the World Chocolate Masters

Sébastien Trudelle enrobing his chocolates

Enrobed chocolates

Judging of the enrobed chocolates

Michaela Karg's sculpture

The International Experience

Shigeo Hirai's winning sculpture

Serge Valla of Spain preparing his moulded chocolate

Moulded chocolates from group A

Moulded chocolates from group B

1st place—Shigeo Hirai (Japan), 2nd place—Lionel Clement (USA), 3rd Place—Michaela Karg (Germany)

Natexpo Trade Show and Kaoka Chocolates

Location

- Paris, France (Natexpo Trade Show)
- Le Pontet, France (Kaoka Chocolates)

Contact

- Guy Deberdt, Kaoka Chocolates

Objectives

- To gain knowledge on the production of organic and fair-trade chocolate.
- To understand how the supply chain works from bean to bar in organic chocolate manufacture.

Outcomes

Natexpo is an event that showcases the producers and suppliers of the Organic Industry in Europe. Mercieca was invited to Natexpo '09 to meet with Guy Deberdt from Kaoka Chocolate, a company based in Le Pontet, in the south of France.

Kaoka is a company that solely produces organically grown and fair-trade chocolate from bean to bar. Kaoka is the brainchild of Andre Deberdt an expert in the organics field since 1970 and is regarded as one of the pioneers of the organic movement. During his time in Toga, in the Eighties, Andre Deberdt discovered cocoa growing there and was passionate about making the first organic chocolate. Unfortunately, the civil war prevented him from pursuing that at the time, but in 1993 Kaoka commenced operation.

Mercieca was able to gain an understanding of the ideologies, working methods, environmental and social impacts of a company that deals with each step of the supply chain from the fermentation of the beans to the manufacture of the chocolate bar in a deliberately ethical way.

The Fellow learnt that Kaoka work with a cooperative of cocoa growers in various parts of the world, such as Ecuador, São Thomé, Príncipe and Vanuatu. They purchase the cocoa beans from these growers freshly husked, prior to the fermentation process.

This means that because they buy the beans in unfermented state they can control the fermentation process, thus ensuring consistency. Once the beans are fermented, they are laid out to dry in the sun, or, if the weather does not permit, they have large gas fired driers to dry the beans.

The dried cocoa bean is shipped to the Netherlands for processing into cocoa liquor, cocoa butter and powder. Due to the chocolate being produced in the Netherlands alongside conventional chocolate, Kaoka have in place very strict procedures to ensure their product is totally organic. They conduct pesticide analysis to make sure there is no cross contamination in each batch that is made. Then the cocoa by-products are shipped to the Kaoka manufacturing plant in the north of France, where they are produced into Kaoka's chocolate.

Kaoka pay a negotiated flat 'guaranteed minimum contract price'[25] to the farmers for their beans that is well above the world commodity price. The flat rate method of payment is to ensure there is no major fluctuation in the prices for the farmers and they have a consistent income to support their families and invest money back into their farms. Kaoka also re-invest into the communities where they buy their cocoa by investing in infrastructure for the cocoa cooperatives. This enhances the quality of the cocoa, the working conditions and the lives of the farmers, their families and cocoa workers.

As quoted on Kaoka's website:

> *"All these beans have achieved the level required by the brand BIO EQUITABLE, controlled by ECOCERT. The batches are duly numbered, listed, graded, so that, should the need arise, the smallest problem in the production process could be remedied at source. The requirement for controls at every stage promotes lasting and sustainable excellence."*

Concluding Remarks

The Fellow's intention in pursuing professional development in Europe from leading chocolatiers was to gain skills in contemporary and traditional chocolate production. What was significant to the Fellow was the availability of information, where to gain skills and the visibility of artisan chocolatiers in the market alongside large-scale manufacturers.

There is a longer history of chocolate making in Europe than in Australia. Whether this is one of the reasons for our small industry and the lack of focus in artisanal products it is not clear. Barcelona in particular has around the same population as Melbourne. What is interesting is that there is a larger prevalence of cutting-edge chocolatiers in Barcelona than in Melbourne, and all of these businesses are very successful. There is more of a 'culture of chocolate' there and people are accustomed to eating high quality darker chocolates.

As a self-trained pastry chef and chocolatier, Mercieca felt that the skills, knowledge and confidence gained in Europe from the chocolatiers she trained with were invaluable. The network that has been created through this Fellowship is also important to the Fellow for continuation of learning and the potential for other Fellows and industry professionals to train and enhance their skills.

[25] http://www.kaoka.fr/cadre258.php?sCadre=inter/html/uk/accueil/index.php&cookLangueTmp=uk

Knowledge Transfer: Applying the Outcomes

One of Mercieca's main aims during her Fellowship was to acquire skills and knowledge that can help address the deficiencies within the chocolate industry in Australia. The Fellow's intention is to transfer these skills and this knowledge to other industry professionals through education and training.

Since her return to Australia, Mercieca has been incorporating the skills and knowledge acquired overseas into her current position as Head Chocolatier at Kennedy & Wilson Chocolates, and into her own business Fraise Sauvage. She aims to consolidate what she has learnt during her Fellowship with hands on practice, and to convert her new knowledge and skills into an Australian context prior to teaching practical workshops.

Mercieca will conduct a series of talks to the industry on the experience of her Fellowship, and the experience of being a chocolatier in Australia. In these talks she will discuss the importance of good training. She will also compare the training that is currently available in Australia to that which is offered overseas, looking at ways in which Australia could improve its training systems, and at the benefits currently available to people only through overseas training. She will also discuss the Organics and Fair-trade movements, and talk about ways to align Australia with these ethical trends through using products that are fair-trade and environmentally sustainable.

The Fellow also proposes to hold a forum with fellow chocolatiers and industry professionals to discuss the industry's current trends and strategies, and possible directions for the industry to take in the future in order to create an international reputation as a highly skilled chocolate nation. Within this forum, Mercieca intends to discuss the need for an apprenticeship system in chocolate making, and the possibility of introducing Master artisan qualifications in Australia. Another discussion point to be raised is the question of how we intend to create better training in Australia for our employees, and ourselves as professionals, that is suited and is practical to current trends and techniques in this growing industry.

Based on her various discussions and observations in Europe, Mercieca believes that a Chocolatiers' Alliance must be formed in Australia, and would like to discuss this possibility with other professionals. This would create and provide a forum where industry professionals, or people interested in joining the industry, can access information on education, training and qualifications, and also discuss industry trends, techniques and technologies. It is Mercieca's opinion that the creation of such an alliance would help the chocolate industry to grow in strategic and informed ways, and enable it to position itself strongly within the global context.

The Fellow will develop, organise, and run training workshops that focus on the skills involved in making chocolate with ethically sourced ingredients. These methods in chocolate making can bring new levels of sophistication to the organic and fair-trade market. In order to increase the possible training avenues, Mercieca plans to discuss with private schools the potential of creating ongoing long-term chocolate training packages, which provide an alternative, recognised qualification for chocolatiers in Australia.

Also, Mercieca proposes to write resources and help to initiate a specific training package for chocolatiers within the accredited national training curriculum. She will push for a Certificate IV in Patisserie that specialises in chocolate as a qualification that encompasses both artisanal and industrial manufacture. This can provide multi-skilling of the students and open avenues in more than one sector of chocolate production.

Recommendations

Government

The Fellow strongly believes that the appropriate government departments should now work together in creating and supporting accredited master artisan qualifications. These bodies should now provide funding for the education institutions to implement the necessary infrastructure to provide this qualification. This will help young people to pursue chocolate making as a profession from a young age and provide school leavers with the necessary skills to start a career in this field.

Recommendations:

- Introduce a trade qualification for chocolatiers and endorse an apprenticeship scheme for chocolatiers. Also to incorporate into school VET programs a course subject in chocolate making within the Kitchen Operations Course.
- The appropriate government department is to investigate ways in which to provide accessible and affordable information on the industry in relation to all aspects of the chocolate industry. Furthermore, it is important that information be available that is not just confined to large-scale confectionary manufacture, but informs people on all areas of chocolate production including the growing area of artisanal and boutique chocolate making.
- Provide support and funding for the industry to export Australian made chocolate overseas, thus enabling the Australian chocolate industry to exist on an international scale.
- Provide support with the importation into the country of raw ingredients and other goods such as cocoa products.
- Promote our national industry and help to provide more employment opportunities.

Industry

With training being confined to a largely confectionary-based curriculum, there needs to be a push from the industry for TAFE Institutes to provide adequate training for current and future industry professionals.

Due to increased consumer demand and a global impetus for the eradication of poor working conditions for farmers and their families and environmental sustainability, Mercieca strongly believes that it is necessary for chocolate companies to align themselves ethically in this industry, to promote and support fair trade and to be transparent about the origins and processes behind the ingredients they use.

Given the current environmental concerns it is time now for businesses to behave responsibly, by looking from a holistic viewpoint at the entire Supply Chain, reviewing approaches to recycling, waste management, and using alternative energies such as solar, or wind and looking at ways to minimise their impact on the environment. A prime example is packaging. Excessive use of plastic and paper should be eliminated, and the use of recycled paper increased.

Also identify companies that provide environmentally friendly alternatives that also suit the business, such as printing business cards on recycled card and using vegetable based inks. Small changes can make an enormous difference and can be equally cost effective.

Recommendations

Recommendations:

- Clearly identify the difference between artisanal chocolate work and large-scale manufacturing.
- Communicate with our competitors and strive to push our industry forward with training our staff, advancing our own skills and sharing them in our industry community.
- Keep jobs in Australia and support the economy and the workforce by not out-sourcing work to countries that offer cheap and unsustainable labour.

Professional Associations

An alliance between current and emerging chocolatiers can only strengthen the industry and develop the skills in Australia to an internationally competitive level.

Recommendation:

- Create a Chocolatiers' Alliance or academy where by one can direct future chocolatiers to enable them to find the right training and endorsed qualification packages to lead them to a recognised profession as a chocolatier.

  This would also have the effect of developing a source of information for industry professionals, and aspiring industry professionals, to advance their skills, or find out how to create a pathway into the industry.

Education and Training

At present there are insufficient avenues for interested people to gain the training necessary to improve the overall skill level of the Australian chocolatier industry.

Recommendations:

- Private Registered Training Organisations are to offer alternative sources of training to the TAFE system with ongoing long-term training for industry professionals that are aimed at an apprenticeship level and a master artisan qualification.
- A Certificate IV Patisserie specialising in chocolate is to be created within the existing TAFE infrastructure.
- A Certificate IV post-pastry program, that is a specialised chocolate qualification, encompassing both artisanal and industrial manufacture to allow for choice and multi-skilling would be beneficial to the industry. There is interest in the industry for more training to be available that is in-depth, practical and thorough, and that will enable people wishing to pursue a career as a chocolatier to become qualified in this field.

Community

The future will be about sustainability, organics and fair trade; at present there is little, if any, specific training relating to this aspect of chocolate manufacture. As outlined earlier in this report, the skills and knowledge are already being developed overseas to address this area of production. Unless the Australian industry immediately recognises this deficiency and introduces actions to remedy this weakness, we will fall further behind our international competitors.

Recommendations:

- The community, through the consumer bodies, need to support companies that are local and are adopting fair-trade activities, and work only with organic material.
- Consumers to demand that companies be transparent about their ingredients, where ingredients come from and how they are used.

ISS Institute

Recommendatons:

- Aid in the bridging of skill shortages and deficiencies by continuing to offer Fellowships to people in the industry that will further the outcomes and of this Fellowship.
- Continue in the pursuit of recognised credentials, such as a Master artisan qualifications in universities and TAFEs around Australia.
- Promote workshops run by the Fellow that will help to spread the skills learnt overseas and aid in closing the skills and knowledge deficiencies within the chocolate industry.

Further Skill Deficiencies

1. How to grow and cultivate the cacao plant

The growing of cocoa and cultivation in Australia is limited. One company is currently working on their plantation in the North of Queensland and hopes to have cocoa available in 2011. Given this opportunity, skills in this area in Australia would need to be developed to provide possibilities for employment in this area of cocoa production.

Another reason for the importance of training in this area is that it enables the chocolatier to fully understand each process of cacao production and subsequently chocolate production. In other countries with a rich history in growing and cultivating Cacao, there are skills and knowledge on offer, which could potentially enhance the industry in Australia.

2. Making moulds from materials such as food grade silicon and polycarbonate

One aspect of chocolate making is moulding. Further development is needed in the area of mould making, both polycarbonate and food grade silicon. Currently the moulds that are mostly available are polycarbonate moulds. Most of these moulds are imported from Belgium, France, Germany, Italy and more recently Turkey. There could be an opening for an Australian chocolate mould making company to be created. This could lessen the costs for chocolatiers that need to import moulds from overseas and create jobs in this field locally.

- How to design moulds.
- How to transform designs into moulds.
- How to work with the materials necessary for mould making

3. Molecular Gastronomy[26] techniques with chocolate

Molecular gastronomy is a scientific approach to the physical and chemical processes that occur in cooking.

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[26] *Molecular gastronomy: the chemistry and physics behind the preparation of any dish*, Hervé This, http://www.nature.com/embor/journal/v7/n11/full/7400850.html

Recommendations

Understanding what is happening scientifically to the product you are making enables you to achieve optimum results. Alternately, it allows for the development of unusual and intriguing foods.

Skill areas include:

- How to use food science to create cutting-edge chocolate filling concepts and designs.
- How to apply the use of natural substances, such as agar agar and seaweed extract, to create interesting textures in chocolate production. Developing an understanding of what substances achieve what result.
- Combining molecular gastronomy with traditional chocolate making to create recipes for individual chocolate pieces, such as popping candy truffles, liquid centre chocolates and chocolate caviar.

4. Other skills required of the chocolatier

- How to create a recipe for couverture. What to look for when trying to use couverture for specific applications, two examples of this would be coating chocolate or chocolate for baking.
- How to source, select and import organic cocoa beans, chocolate and chocolate products.
- How to roast the cocoa beans and identify the machinery required.
- How to select quality cocoa beans.
- How to distinguish between a high quality bean and a lesser quality bean.
- How to identify the flavours in each bean to achieve a desired flavour in chocolate.
- How to select other ingredients with regard to quality and flavour, such as cocoa liquor, cocoa butter, cocoa, milk powders, sugars.

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