

(序言的英语部分, 请保留)

## Foreword

This book has resulted from an innovative project carried out at Yangling Vocational and Technical College (YVTC) in the Shaanxi Province of China. The work – a collaborative joint venture between the non-profit organisation Flemish Association for Development Cooperation and Technical Assistance (VVOB) of Belgium and YVTC – aims to develop food-processing technologies to help stimulate economic development in the rural community. Shaanxi, due to its climatic conditions, is famous for its production of apples and pears. The project, therefore, paid special attention to the manufacture of cider and perry from locally grown fruit, and the opportunity thus provided to add value to the crop.

It has been a great honour to be invited to supply technical assistance and advice to the project and, specifically, to assist with the production of this book. The work was carried out during a visit to Shaanxi Province and Yangling town in the spring of 2003. I was struck, firstly, by the economic benefits and prospects that could be provided through processing locally grown fruit into cider, perry and other products and, secondly, by the enthusiasm and dedication of the staff of VVOB and YVTC, and the local farmers and growers, with respect to this new development.

Although Cider the fermentation of fruit juice is recorded in ancient Chinese, Egyptian, Greek and Roman writings, historically, the main places in which cider and perry have been produced on any large scale are England, France, Spain and other European countries.

Most of the research work associated with cider production originated from the Long Ashton Research Station (LARS) near Bristol in the UK, where the National Fruit and Cider Institute was based from its opening in 1903. Cider related work at LARS ceased in 1986, however much of the success of the UK and world industry can be attributed to the research – much led by Dr. Fred Beech - carried out during the years of operation. Also in the UK, specialist training in cider making and some research was carried out at a centre at Hindlip College near Worcester between 1985 and 2000, after which it was moved and renamed as Core Food & Drink. Here, work associated with cider production stopped in early 2003 due to restructuring. Additional work has, and still is, carried out in France, at the INRA (National Institute for Agronomy Research) station near Rennes, and in universities and wine research institutes based in Spain, Germany, Switzerland and Austria.

Using the information, knowledge and experience developed in these major cider-making countries of the world, this book aims to offer practical guidelines for people and businesses in China who wish to start making cider and perry. It also provides some technical background and an outline of the underlying science of the production process.

After a general background to cider manufacture - including a history of the industry, an introduction to the different kinds of cider and fruit wines,

equipment requirements and an outline of the whole process - the book takes the reader through the different production stages from apple growing and fruit harvesting to final product make-up and packaging. The initial chapters of the book cover the main principles of cider apple orcharding and fruit characteristics, a description of the methods of juice extraction and the techniques involved to ensure that the juice, prior to fermentation, is of an appropriate compositional standard and quality. Further chapters take the reader through fermentation and its microbiology, racking and maturation, and an introduction to the main methods of blending, clarification, final product preparation and bottling. Additionally, there are sections on the potential faults in cider, laboratory analysis, taste evaluation and HACCP and Quality Assurance.

Although the text is designed to be useful section by section, it is suggested that the reader begins with the first chapter, which as outlined above, aims to provide an overall introduction to the whole process. As emphasised throughout the text, the reader is also encouraged to remember the most important aspects involved in making good quality cider. These are, firstly, careful selection and use of fruit, appropriate technology, equipment, fermentation yeasts and other materials. Secondly, to ensure that the initial juice is adjusted to an appropriate specification prior to fermentation and the other essential production processes, such as keeping out air, racking and maturation are always carried out effectively. Thirdly, the need to monitor the process, which, along with a requirement for good record keeping, will assist a continual process of improvement. And, last of all, but not least – the need to maintain good standards of hygiene at all times!

In summary, over the past 10 years or so, cider drinking and production has had a significant resurgence of interest across the world, particularly where apples are widely grown. However, when compared to many other cider and perry producing countries, China is only just at the beginning. The potential and the opportunities are huge. China has, in areas such as Shaanxi Province, the appropriate climate to grow good quality apples and pears for cider and perry production, it has the resources and it has a prospective vast market within its own borders. Additionally, as indicated by the publication of this book, it is starting to gain the expertise needed for the manufacture of the products.

To move forward, China must continue to seek out, learn and exploit the best knowledge, experience, methods and technologies. It also must start engaging with its possible marketplace through the use of consumer studies and market research. And, finally, it must recognise and promote the relatively high value of cider and perry. The products, when well made, are refreshing drinks of good flavour, general wide appeal, with benefits to health and, above all, made from two of the most elemental foodstuffs – apples and pears. Enjoy!

*By Peter Mitchell*

### **About Peter Mitchell**

Peter is an international consultant in cider making, with many years of experience. As well as being an award winning Cidermaker in his own right and being involved in research in cider production, he was responsible for establishing the internationally recognised cider making courses at Hindlip College, in the UK. Up until recently he led *Core Food & Drink – a Centre of Excellence for the Cider, Food and Drink Industry*. He now runs his own expert advisory business – *Mitchell F&D* – contactable through the website: <http://www.mitchell-food-drink.co.uk>.

This book has made significant use of the notes associated with some of the training courses run by Peter.

（序言的汉语部分）：

## 序言

本书是中国陕西省“杨凌职业技术学院（YVTC）”与“比利时佛拉芒区国外教育计划协会（VVOB 组织）”合作开展食品加工项目的成果，该项目通过中国与比利时在食品加工技术方面的进行合作来促进当地经济的发展。陕西的自然气候条件十分适合苹果和梨的生长，为了充分利用当地丰富的苹果资源，增加其附加值，该项目将重点放在苹果酒生产技术的研究推广上。

本人在 2003 年春季，受 VVOB 组织邀请，到陕西省杨凌农业高新产业示范区进行苹果酒加工方面的技术指导，并受本书主编的委托提供了部分英文资料。在中国陕西逗留期间我一直在想，如果当地丰富的苹果和梨资源被加工成苹果酒和梨酒，有可能给当地带来的巨大经济收益，并且因为中国巨大的消费市场而具有良好的发展前景。杨凌职业技术学院 VVOB 项目工作人员积极奉献的工作精神，也给我留下了深刻的印象。

虽然利用果汁发酵果酒在古代中国、埃及、希腊和罗马都有记载，但目前大规模生产苹果酒的国家主要有英格兰、法国、西班牙和其它欧洲国家。

目前世界上大部分与苹果酒生产有关的研究工作都源于英国布里斯托尔附近的郎·阿什顿研究站（Long Ashton Research Station）。英国国家水果和苹果酒协会 1903 年成立于此，尽管郎·阿什顿研究站的苹果酒研究工作于 1986 年停止，但无论是英国还是世界苹果酒工业的成功，均应归功于 Fred Beech 博士领导下郎·阿什顿研究站开展的有关苹果酒生产的研究工作。1985 至 2000 年英国苹果酒加工方面的专业培训和研究工作移至伍斯特附近的 Hindlip 学院

进行，并被重新命名为“食品与饮料中心（Core Food & Drink）”。2003 初期由于机构重组而又一次停止了与苹果酒研究有关的工作，但她仍然与法国雷恩附近的苹果酒研究中心（INRA station），以及西班牙、德国、瑞士和澳大利亚的有关大学以及苹果酒研究机构进行着合作研究。

本书在综合世界上主要苹果酒生产国苹果酒生产方面经验的基础上编撰而成，旨在为在中国已从事（或欲从事）苹果酒和梨酒生产的生产者提供实践上的指导，同时也为相关研究者提供与苹果酒生产有关的技术背景和科学理论。

本书在简要介绍了苹果酒生产的背景（包括苹果酒工业的历史、不同种类苹果酒、苹果酒酿造所需的设备及苹果酒生产的一般工艺流程）之后，展现给读者的是如何从苹果的栽培、收获直到苹果酒的发酵和包装所涉及的每一个环节。本书的第二章主要介绍了酒用苹果的栽培原理和主要特性，第三、四章介绍了榨汁方法和果汁成分的调整。以后的章节相继介绍了苹果酒发酵及其微生物学；倒酒和陈酿；澄清的方法；产品的调配，灌装；苹果酒的病害；苹果酒的理化指标和微生物指标分析；苹果酒的风味评价及 HACCP 质量控制体系等内容。

尽管本书每一章都是相对独立的内容，但建议读者能从第一章开始阅读，因为本章对苹果酒酿造的所有有关内容进行了概要的介绍，给读者一个有关苹果酒生产技术的总体印象。本书始终不忘强调酿造质量上乘苹果酒的关键在于：首先是精心选择所需的苹果原料、工艺流程和设备、发酵用的酵母和其它有关材料；其次是将发酵醪各成分含量调整到适当的水平，发酵过程中要隔离空气、进行有效的倒酒和陈酿；再次是对整个生产过程要进行监控，并保留记录以便于对酿造技术的不断进行改进；最后一点也是最重要的一点，始终要保证良好的卫生条件。

在过去的 10 年中，苹果酒生产在整个世界得到了长足的发展，尤其在苹果种植面积比较广的国家。然而，与其它苹果酒生产国相比，中国的苹果酒产业才刚刚起步，苹果酒生产具有巨大的市场潜力。尤其像拥有种植优质苹果独特气候条件的陕西省，能够生产出适合酿酒的高质量苹果。高质量的丰富苹果资源和巨大的市场前景，加之从本书中获得酿造苹果酒的专业知识，一定会酿造出高质量的苹果酒。

当然，中国必须继续探索和学习苹果酒生产方面的知识、经验、方法和工艺，同时通过宣传和市场调研开发苹果酒市场。最后我要再次说明的是苹果酒是一种利用苹果经过酿造，具有良好风味，风靡世界的清爽饮料，是一种众所周知的健康饮品能给生产者带来高附加值。

*Peter Mitchell*

**Peter Mitchell:** 国际苹果酒酿造顾问，具有多年的实践经验，曾在苹果酒研究方面获得多项大奖。负责在英国 Hindlip 学院进行国际性苹果酒酿造课程的讲授和认证工作，并主持食品与饮料中心（苹果酒研究中心）工作，是英国苹果酒商业协会顾问委员会成员之一。此书引用了 Peter Mitchell 主编培训教材中的部分内容。<http://www.mitchell-food-drink.co.uk>

## 前言

农产品深加工一直是一项很有潜力的事业，很多农产品经过一道深加工，就可以找到很多新的卖点，而从市场行情来说，深加工后的产品身价可能是原先的 3 倍、4 倍乃至十几倍。但是目前中国果蔬的深加工能力非常有限，加工水平比较低，水果加工率不到 10%，蔬菜则不到 1%，果蔬加工增值不够；而在发达国家这些数字都很高，水果能达到 50% 以上，蔬菜能达到 60%~70%。发达国家的农产品加工业产值是农业产值的 3 倍以上，而我国还不到 80%；发达国家食品工业总产值与农业总产值之比是 2~3:1，而我国仅为 0.3~0.4:1（其中西部省区仅为 0.18:1）。

从 1996 年开始，比利时佛拉芒区国外教育计划协会（简称 VVOB 组织）与陕西省杨陵职业技术学院合作致力于“VVOB 食品加工项目”在中国西部的实施，其目的是通过研制和推广食品加工技术，为陕西经济的发展、当地农民的增收做出积极贡献。

由于陕西自然条件非常适合优质苹果的生产，在农业种植结构调整政策的引导下，苹果种植业高速发展。2000 年陕西生产苹果 389,000,0t，占全国苹果总产量 17.6%，居全国第二位，成为仅次于山东的苹果生产大省，在未来的若干年陕西苹果产量将进一步提高。但是由于品种结构不合理等因素的影响，现阶段在陕西的一些地区出现了卖果难的问题，加上水果采后的损耗达到 25%~

30%，果农丰产得不到丰收，影响了农民的种植积极性，因此苹果产后处理和深加工是目前急需解决的问题。

1999年“VVOB食品加工项目”将注意力集中在苹果酒及其它果酒制作技术研究推广上。我们从购买一个10L的玻璃瓶开始，装上自己设计的空气栓，从市场上购买苹果进行榨汁、发酵，我们的第一批苹果酒就这样生产了出来。不久我们又建立起了拥有不锈钢发酵罐、泵、榨汁机、灌装机的小规模苹果酒生产线，从那时起我们开始为几家果酒厂提供技术和咨询服务。在我们进行苹果酒研制开发的同时，市场上也陆续涌现出了相类似的果酒产品，在2002年的一年一度中国杨陵农业高新技术博览会上，我们欣喜地看到展销商们在展销着用桃、猕猴桃、蓝莓、樱桃、柿子制作的各种各样的果酒。

在搜集苹果酒酿造的有关资料时，我们发现许多参考书侧重于介绍大规模的葡萄酒生产，有些非常专业，对发酵动力学进行详尽的阐述；而有些从外文资料直译过来，非常晦涩难懂。很难找到可操作性强、适合中国国情的果酒酿造资料，尤其是专门关于苹果酒以及针对陕西苹果进行加工的书几乎不存在。因此，我们决定从小试验开始将我们的经验进行整理，参考国内外一些可操作性强的有关书籍，以及一些为酿酒爱好者编写的小册子和互联网上为酿酒爱好者提供的信息，将其汇编成册，重点介绍小规模酿酒的原理和实践过程，但也不排除大规模酿酒学的内容。在欧洲和北美小规模酿造果酒仍然很普遍，越来越多的人（他们并非食品加工方面的专家，有些只是一些农民）试着制作自己的果酒，他们常常在晚餐后与朋友共享他们的“研究”成果，我们常常问自己这在中国为什么不能成为可能？中国人酿酒虽已有几千年的历史，但当今果酒加工和消费情况并不令人乐观。我们希望通过这本书教会您如何自己酿造优质苹果酒，当然我们所采用的技术比较传统，与欧洲大规模苹果酒制造工艺不尽相同。

我们写这本书的目的不是进行学术研究，我们想通过编撰一本实践性很强的小册子，加深国人对果酒的理解，从而感召当地的企业家建立一些小型企业，或者一些志趣相同的人因为爱好而开始自己的试验。当你掌握了一定酿酒技术后，你还可以进行自己的发明：或者将不同的水果混合在一起，或者采用不同的发酵技术，或者用传统的中草药调节风味。通过此书的引导，你只需一些简单的理化和微生物知识，投资一些小小的设备即可走进果酒发酵的艺术天

地。值得一提的是这本书不仅浅显易懂、注重实践，同样注重最新科技成果的反映，也可以用作酿酒科技工作者的实践指导书。

本书的第一章、第三章至第九章、第十章由 Carl Lachat、马兆瑞编写，第二章由马兆瑞、马志峰编写，第十一章由祝占斌编写，第十二章由李巨秀编写，第十三章由汤高奇编写，第十四章由师俊玲、张小平编写，第十五章由许克勇、Carl Lachat 编写，此书引用了 Peter Mitchell 主编苹果酒加工及检验技术培训教材中的部分内容。由师俊玲对本书的第十章至第十五章进行统稿，马兆瑞对全书进行了最后的统稿。马志峰、祝占斌对本书的文字进行了审阅，李元瑞、李鹤荣对本书的内容进行了审阅。

Pictures by Ding Xia

*Carl Lachat、马兆瑞*

*2003.9 于杨陵*

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(请将卡尔的致谢部分保留为英语)：

## 致谢

### Carl Lachat 的致谢

Carl wishes to thank his girlfriend Sara for her everlasting support during the work in China (through good and bad right?). Much appreciation also goes out to my colleague Jan Van de Velde and his wife Eva, Ma Zhou Rhui, Tang Goa Qi and Wang Zhi Min, Rupert Knowless and Lana Mo for daily life in China. The president Zhang Zhao Hui and dean of the agricultural department Li He Rong for making this book possible and the VVOB for the financial and organizational support. Thanks to Psycho Joseph “the Corel Draw master” for working hard towards the deadlines. Special thanks finally for Peter Mitchell. His technical assistance, constructive comments and enthusiasm for cider making was the spark to keep us on the right track and finalize this book as you are holding it now. I hope it may inspire you all.

### 马兆瑞的致谢

VVOB 项目在我院已执行 8 年，取得了丰硕的成果，此书正是所取得的成果之一。在此我首先要感谢比利时佛拉芒区国外教育计划协会、杨陵职业技术学院以及农学系的各届各级领导，对我们项目组成员的关怀和工作上的大力支持。其次我要感谢那些默默无闻，曾经或正在给予我们工作上大力支持，工作于各个部门的同事们。我还要感谢那些不远万里从比利时来到我们学院，长驻于此，与我们同甘共苦的专家们，他们刻苦努力的敬业精神和轻松愉快的生活态度深深感染着我。尤其是“三秦友谊奖”获得者 Vincent Stehli 先生，正是由于他的建议，我们在 1997 年酿得了第一罐苹果酒，并于 1999 年获得杨凌示范区科研专项经费和比利时 VVOB 组织对苹果酒研究项目的联合资助。4 年来，由于他的继任 Carl Lachat 先生的不断努力，我们的苹果酒生产已初具规模。最后我要感谢我的父母和爱人对我工作一如既往的支持，谢谢！

(请放在扉页醒目的地方并保留英语):



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比利时佛拉芒区国外教育计划协会（简称 VVOB 组织）对于此书的出版提供了经济支助。

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### 作者简介（放在封底照片旁）

**Carl Lachat**，1975 年出生于比利时，曾获得生物化学与农业和食品科学与营养双硕士学位。在越南与埃塞俄比亚工作过，从 2001 年 4 月至今作为比利时佛拉芒区国外教育计划协会（VVOB 组织）的食品加工项目专家来到杨陵职业技术学院工作。

**马兆瑞**，女，1968 年出生，曾获北京农业工程大学食品工程学士学位和西北农林科技大学食品科学硕士学位。大学毕业后一直从事食品加工方面的教学、科研和技术推广工作。1995 年起在杨陵职业技术学院中国比利时食品研究中心担任中方负责人工作，在参与管理的同时主要从事发酵食品加工工艺和质量控制的研究和教学工作，主要科研项目为“苹果酒的生产工艺研究”、“干酪的生产及其质量控制”。并于 2000 年到比利时根特大学专门就发酵食品加工和质量控制体系的内容进行了培训。

