

# Contents



<i>Preface</i>	xii
<i>Acknowledgements</i>	xiii
<i>Introduction</i>	xiv
<b>Chapter 1 The Science Underpinning Food Fermentations</b>	<b>1</b>
Micro-organisms	3
Microbial metabolism	5
Nutritional needs	5
Environmental impacts	10
Temperature	10
pH	12
Water activity	13
Oxygen	14
Radiation	15
Hydrostatic pressure	15
Controlling or inhibiting growth of micro-organisms	16
Heating	16
Cooling	17
Drying	17
Irradiation	17
Filtration	17
Chemical agents	17
Metabolic events	19
Catabolism	19
Anabolism	24
The origins of the organisms employed in food fermentations	26
Some of the major micro-organisms in this book	28
Yeast	29
Lactic acid bacteria	31
Lactococcus	32
Leuconostoc	32
Streptococcus	32
Lactobacillus	33
Pediococci	33
Enterococcus	33
Providing the growth medium for the organisms	33
Fermenters	34
Downstream processing	34

Some general issues for a number of foodstuffs	34
Non-enzymatic browning	35
Enzymatic browning	36
Caramel	37
Antioxidants	38
Bibliography	38
<b>Chapter 2 Beer</b>	<b>40</b>
Overview of malting and brewing	40
Barley	43
Mashing: the production of sweet wort	51
Milling	51
Mashing	52
Adjuncts	56
Wort separation	57
Lauter tun	58
Mash filters	58
Water	60
Hops	61
Wort boiling and clarification	63
Wort cooling	65
Yeast	66
Brewery fermentations	70
Filtration	74
The stabilisation of beer	74
Gas control	75
Packaging	75
Filling bottles and cans	76
Filling kegs	77
The quality of beer	77
Flavour	77
Foam	86
Gushing	86
Spoilage of beer	86
Beer styles	88
Bibliography	88
<b>Chapter 3 Wine</b>	<b>89</b>
Grapes	89
Grape processing	93
Stemming and crushing	94
Drainers and presses	96
Fermentation	98
Juice	98
Yeast	99

Clarification	100
Filtration	101
Stabilization	101
The use of other micro organisms in wine production	101
Champagne/sparkling wine	102
Ageing	102
Packaging	103
Taints and gushing	105
The composition of wine	105
Bibliography	105
<b>Chapter 4 Fortified Wines</b>	<b>106</b>
Sherry	107
Port	108
Madeira	109
Bibliography	110
<b>Chapter 5 Cider</b>	<b>111</b>
Apples	112
Milling and pressing	113
Fermentation	115
Cider colour and flavour	117
Post-fermentation processes	119
Problems with cider	120
Bibliography	121
<b>Chapter 6 Distilled Alcoholic Beverages</b>	<b>122</b>
Whisk(e)y	122
Distillation	124
Whiskey variants	128
Cognac	128
Armagnac and wine spirits	129
Rum	130
Bibliography	132
<b>Chapter 7 Flavoured Spirits</b>	<b>133</b>
Vodka	133
Gin	134
Liqueurs	135
Bibliography	142
<b>Chapter 8 Sake</b>	<b>143</b>
Sake brewing	147
Polishing, steeping and steaming	148
Making koji	149
Making moto	149

Moromi	150
Modern sake making	151
The flavour of sake	151
Types of sake	151
Serving temperature	152
Bibliography	153
<b>Chapter 9 Vinegar</b>	<b>154</b>
Vinegar making processes	155
Malt vinegar	156
Wine vinegar	157
Other vinegars	157
Chemical synthesis of vinegar	158
Balsamic	158
Bibliography	159
<b>Chapter 10 Cheese</b>	<b>160</b>
Milk	161
The culturing of milk with lactic acid bacteria	164
Milk clotting	164
Whey expulsion	165
Curd handling	165
The production of processed cheese	166
The maturation of cheese	166
Bibliography	168
<b>Chapter 11 Yoghurt and Other Fermented Milk Products</b>	<b>169</b>
Bibliography	171
<b>Chapter 12 Bread</b>	<b>172</b>
Flour	173
Water	173
Salt	173
Fat	174
Sugar	174
Leavening	174
Additives	175
Fermentation	176
Dough acidification	177
Formation of dough	177
Leavening of doughs	178
Processing of fermented doughs	178
Baking	178
Bread flavour	179