



## Table of Contents

<b>1. The Nutritional Contributions of Milk to Humans</b>	<b>1</b>
1.1. Introduction	1
1.2. Milk: The Complete Meal	2
1.3. Milk Components	4
1.4. Consume and Utilize	6
1.5. Summary	9
1.6. References	10
<b>2. The Dairy Industry</b>	<b>11</b>
2.1. Introduction	11
2.2. Dairy Industry	12
2.3. Emergence of Dairy	16
2.4. Production System	17

2.5. Organizational Outline of A Dairy Industry	18
2.6. The Role of Dairy Industry in The Economy	20
2.7. Dairy Industry: A Global Scenario	22
2.8. Summary	25
2.9. References	26
<b>3. Breeds of Dairy Cattle</b>	<b>27</b>
3.1. Introduction	27
3.2. Ayrshire	27
3.3. Guernsey	28
3.4. Brown Swiss	30
3.5. Jersey	31
3.6. Holsteins	32
3.7. The Milking Shorthorn	33
3.8. How to Choose A Dairy Breed	34
3.9. Summary	35
3.10. References	36
<b>4. Dairy Herd Records</b>	<b>37</b>
4.1. Introduction	37
4.2. History of Production Testing	39
4.3. Pros of Production Testing	40
4.4. The Dhi System	42
4.5. Dairy Production Records	44
4.6. Summary	46
4.7. Websites	47
<b>5. Evaluating Dairy Cattle</b>	<b>48</b>
5.1. Introduction	48
5.2. Physical Attributes of Dairy Cattle and Cow	49
5.3. What is a True-Type Dairy Cow?	51
5.4. Evaluation Methods	54
5.5. Summary	56
5.6. References	56
<b>6. Breeding Dairy Cattle</b>	<b>57</b>
6.1. Introduction	57
6.2. Genomics and Genetic Selection	58

6.3. Genetic Evaluation Of Dairy Cattle & Choosing Dairy Females and Males	60
6.3.1. Genetic Evaluation With Genetic-Economic Indexes	60
6.3.2. Genetic Evaluation With Sire Indexes	62
6.3.3. Heritability Estimates	63
6.3.4. Breeding Values	64
6.4. Factors To Consider for Genetic Progress	65
6.4.1. Dairy Cattle Mating Systems	67
6.5. Cautionary Measures	68
6.6. Some Indian Breeds in Farm Animals	69
6.6.1. Rathi	69
6.6.2. Tharparker	70
6.7. Summary	71
6.8. References	71
<b>7. Feeding Dairy Cattle</b>	<b>73</b>
7.1. Introduction	73
7.2. Do Animals Use Nutrients?	74
7.3. Energy, Protein, and Lipids for Dairy Cattle	76
7.4. Minerals, Vitamins, And Water for Dairy Cattle	77
7.5. Feeding Guidelines	78
7.6. Summary	80
7.7. References	80
<b>8. Physiology of Reproduction in Dairy Cattle</b>	<b>81</b>
8.1. Introduction	81
8.2. Understanding The Male and Female Reproductive System	82
8.2.1. Reproductive System of a Male	82
8.2.2. Reproductive System of a Female	84
8.3. Reproductive Process	85
8.3.1. Forming an Egg	85
8.3.2. Fertilization and Gestation	85
8.3.3. Parturition	86
8.3.4. Postpartum Mating	87


8.4.	Factors That Influence Reproduction (Detecting Estrus, Importance of Timing in Conception, Reproductive Efficiency)	87
8.4.1.	Detecting Estrus	87
8.4.2.	Importance of Timing in Conception	88
8.4.3.	Reproductive Efficiency	89
8.5.	Reproductive Irregularities	91
8.5.1.	Breeding Problems	91
8.5.2.	Genetic Progress & Issues	91
8.6.	Dairy Reproduction and Biotechnology	92
8.7.	Summary	94
8.8.	References	94
<b>9.</b>	<b>Physiology of Lactation</b>	<b>96</b>
9.1.	Introduction	96
9.2.	Mammary Glands: Fundamentals of Lactation	97
9.2.1.	Circulatory Aspects of Milk Secretion	98
9.2.2.	Regression of Mammary Glands	99
9.2.3.	Milk Production and Discharging Processes	99
9.2.4.	Milk Let-Down	100
9.2.5.	Residual Milk	101
9.3.	How Hormones Control Lactation	101
9.3.1.	Prolactin	102
9.3.2.	Thyroid Hormones	102
9.3.3.	Somatotropin	103
9.3.4.	Insulin	103
9.3.5.	Adrenal Hormones	103
9.4.	Pros and Cons of Milking Rate & Frequency	103
9.4.1.	Milking Rate	103
9.4.2.	Milking Frequency	104
9.5.	Dry Period Utilization	105
9.5.1.	Usage of Antibiotic	106
9.5.2.	Drying-Off Cattle	106
9.6.	Summary	107
9.7.	References	107

<b>10.Principles of Milking and Milking Equipment</b>	<b>108</b>
10.1. Introduction	108
10.2. Basics Of Milking	109
10.3. Pulsation	110
10.4. Milking Rate	111
10.5. Types Of Milking	112
10.6. Equipment For Milking	113
10.7. Automated Milking Systems	114
10.8. Storage And Preservation Of Milk	115
10.9. Maintaining Milking Equipment	117
10.10.Summary	117
10.11.Websites	118
<b>11.Milking Facilities, Housing and Equipment</b>	<b>119</b>
11.1. Introduction	119
11.2. Milking House	120
11.3. Dairy Cattle Housing	122
11.4. Feeding Systems	125
11.5. Disposing Dairy Wastes	128
11.6. Summary	129
11.7. References	130
<b>12.Dairy Herd Health</b>	<b>131</b>
12.1. Vaccination and Herd Health	131
12.2. Diseases	134
12.2.1. Reproduction	134
12.2.2. Metabolism	135
12.2.3. Lack of Nutrition	136
12.2.4. Tuberculosis and Paratuberculosis	137
12.2.5. Anaplasmosis, Blackleg, Cowpox	137
12.2.6. Infectious Diseases	138
12.2.7. Hardware Disease: Lumpy Jaw (Actinomycosis)	138
12.2.8. Displaced Abomasum	139
12.2.9. Parasites (Internal And External)	140
12.2.10.Poisoning	140
12.3. Summary	141
12.4. References	141

<b>13. Dairy Beef</b>	<b>142</b>
13.1. Introduction	142
13.2. What is Lean Beef?	143
13.3. Breeding and Crossbreeding – Pros & Cons	144
13.4. Slaughter Methods	145
13.5. Finishing Methods	147
13.6. Carcass Disposal	148
13.7. Meat Quality	149
13.8. Summary	150
13.9. References	150
<b>14. Dairy Animals</b>	<b>151</b>
14.1. Water Buffalo	151
14.1.1. Introduction	151
14.1.2. Major Breeds	152
14.1.3. Buffalo Milk Products	157
14.1.4. Production	158
14.1.5. Reproductive Aspects and Feeding Water Buffalo	158
14.1.6. Diseases To Watch Out For	158
14.1.7. Supporting Organizations	159
14.2. Goats	159
14.2.1. Introduction	159
14.2.2. Major Breeds	160
14.2.3. Reproduction of Goats	165
14.2.4. Characteristics of Goat Milk	165
14.2.5. Milking Dairy Goats	166
14.2.6. Major Diseases	166
14.2.7. Dairy Goat Industry And Organizations	167
14.3. Sheep	167
14.3.1. Introduction	167
14.3.2. Production And Trade	167
14.3.3. Breeds	168
14.3.4. Reproduction Of Sheep	170
14.3.5. Composition And Characteristics Of Sheep Milk	171
14.3.6. Milk Production Of Dairy Ewes	171
14.3.7. Major Diseases of Sheep	172
14.3.8. Management and Associations	173

---

14.4. Summary	173
14.5. References	175
<b>15. Managing the Dairy Farm Enterprise</b>	<b>177</b>
15.1. Introduction	177
15.2. Recruiting and Managing Labor	179
15.3. Management Strategies	181
15.4. Factors Affecting Profitability	182
15.5. Summary	184
15.6. References	185
<b>16. Properties of Milk and Milk Components</b>	<b>186</b>
16.1. Biological, Chemical, Physical, and Functional Properties	186
16.2. Dairy Microbiology (Microbes and Role)	188
16.3. Physical Properties of Milk	189
16.4. Utilisation of Milk (Tables) Country Wise	191
16.5. Summary	192
16.6. References	193
<b>17. Determining the Composition of Milk and Milk Products</b>	<b>194</b>
17.1. How To Sample	194
17.2. Composition	196
17.3. Multicomponent Methods	197
17.4. Composition of Milk (Tables) - Animal Wise	198
17.5. Pasteurization (Process and Need)	201
17.6. Milk Testing (Methods and Equipment)	203
17.7. Summary	204
17.8. References	205
<b>18. Milk Quality and Safety</b>	<b>206</b>
18.1. Caution	206
18.1.1. Diseases Transferable Through Milk	206
18.1.2. Food Additive Regulatory Program	208
18.2. Safety of Milk Products on A Global Scale	208
18.2.1. Regulatory Standards For Grade "A" Milk	208
18.2.2. Adulterants Of Public Health Significance	209
18.2.3. Clean And Sanitary Cows and Equipment	210



18.2.4. Related International Organizations	211
18.3. Safety Evaluation Tests	211
18.3.1. Basic	211
18.3.2. Microbiological Tests	212
18.3.3. Chemical Tests	214
18.3.4. Tests For Adulteration	215
18.3.5. Sensory Evaluation	216
18.4. Cleaning And Sanitizing Dairy Equipment and Containers	216
18.4.1. Cleaning Products	216
18.4.2. Sanitizers	217
18.4.3. Recommended Practices	217
18.5. Summary	217
18.6. References	219
<b>19. Dairy Products</b>	<b>220</b>
19.1. Processing Milk And Milk Products	220
19.1.1. Milk Hauling Process	220
19.1.2. Processing Stages	221
19.1.3. Cooling and Refrigeration	221
19.1.4. Processing Standard For Dairy Products	222
19.1.5. Milk Packaging And Transportation	222
19.1.6. Dairy Feeds	222
19.2. Cheeses	223
19.2.1. Introduction	223
19.2.2. Fundamentals of Cheese Making	223
19.2.3. Representative Varieties of Cheese	224
19.2.4. Process Cheeses	224
19.2.5. Enzyme-Modified Cheeses	225
19.2.6. Whey	225
19.2.7. Grading Cheeses	225
19.3. Frozen Desserts From Milk	226
19.3.1. Introduction	226
19.3.2. Types and Components of Frozen Desserts	226
19.3.3. Calculations of Mixes, Compounding and Processing Mixes	227
19.3.4. Refrigeration and Freezing, Hardening	228
19.3.5. Novelties and Specials	228



19.3.6. Quality and Cost Control	228
19.4. Butter and Related Products	229
19.4.1. Introduction	229
19.4.2. Types of Butter	229
19.4.3. Methods and Procedures in Churning	230
19.4.4. Grading and Quality Aspects	230
19.4.5. Butter Products	231
19.5. Concentrated and Dried Milk Products	231
19.5.1. Definitions and Terminology	231
19.5.2. Concentrating and Separating Milk and its Derivatives	232
19.5.3. Physical Properties of Dry Milk, Instant Dry Milk Products	232
19.5.4. The Drying Processes	232
19.5.5. Grading and Quality Assurance	233
19.6. Cultured and Acidified Milk Products	233
19.6.1. Introduction	233
19.6.2. Cultured Milk Products	234
19.6.3. Fermented Milk Products	234
19.6.4. Acidophilus Milk Products	235
19.6.5. Summary	235
19.7. References	238
<b>20. Marketing Milk and Milk Products</b>	<b>240</b>
20.1. Introduction	240
20.2. The Demand for Milk Products	242
20.3. Promotions and Campaigns	243
20.4. Dairy Cooperatives	244
20.5. Production, Prices and Formulas	245
20.6. Risk Management	246
20.7. Sales and Distribution of Dairy Products	246
20.8. Summary	247
20.9. References	248
<b>Index</b>	<b>249</b>