

Contents

Foreword	iii
About the author	v
Other books and technical manuals by the author	vii
Acknowledgements	ix
Acknowledgement of The Crawford Fund	x
Chemical warning	xi
1 Introduction	1
1.1 The importance of young stock management on any dairy farm	2
1.1.1 Benefits of bigger heifers	5
1.2 Outline of the manual	5
1.3 Role of the manual in farmer and adviser training programs	6
1.4 The size of the heifer herd	8
1.5 Key performance indicators for rearing replacement heifers	9
1.5.1 Key performance indicators for components of heifer management	9
1.5.2 Key performance indicators for entire heifer herds	10
2 The two phases of young stock management	13
2.1 The milk feeding calf phase	13
2.1.1 Pre-calving	15
2.1.2 Identification, targets and recording	15
2.1.3 Colostrum feeding management	16
2.1.4 Milk feeding and access to drinking water	16
2.1.5 Solid feeds	16
2.1.6 Preventing and treating scours	17
2.1.7 Health and herd management	17
2.1.8 Managing weaning	18
2.1.9 Environmental management	18
2.1.10 Housing and facilities	18
2.2 The weaned heifer phase	18
2.2.1 Early post-weaning management	20
2.2.2 Targets and recording	20
2.2.3 Forage quality	20
2.2.4 Feeding of concentrates	20

2.2.5	Mating management	21
2.2.6	Health and herd management	21
2.2.7	Environmental management	21
2.2.8	Housing and facilities	22
2.2.9	Pre-calving management	22
3	Digestion of feeds in the milk-fed calf	23
3.1	The calf digestive tract	23
3.2	The milk-fed calf	25
3.3	Rumen development and the process of weaning	27
3.4	The role of roughage in the weaning process	29
4	The nutrient requirements of calves	31
4.1	Water	31
4.2	Energy	33
4.3	Protein	34
4.4	Fibre	37
4.5	Minerals and vitamins	37
5	The importance of colostrum to newborn calves	41
5.1	Current recommendations on colostrum feeding	44
5.1.1	Colostrum quality	45
5.1.2	Timeliness of colostrum feeding	47
5.1.3	Identifying and storing good-quality colostrum	48
5.2	Feeding colostrum to newborn calves	49
5.2.1	How to stomach tube a calf	50
5.2.2	Making best use of transition milk	51
5.2.3	Using stomach tubes to relieve abdominal pressure	51
5.3	Results from overseas research on colostrum feeding	52
5.3.1	Financial benefits from good colostrum feeding practices	54
5.4	Summarising good colostrum feeding management	54
6	Calf and heifer mortalities in the tropics	57
6.1	Difficulties with rearing replacement heifers in the tropics	58
6.2	Surveys of calf and heifer mortalities in the tropics	59
6.2.1	Poor adaptation of imported stock	66
6.2.2	The effect of grazing system on calf and heifer mortalities	66
6.3	Impact of extension programs on calf and heifer performance in the tropics	68
6.3.1	Sri Lankan study	68
6.3.2	Kenyan study	70
6.4	Results from other calf and heifer studies in the tropics	70
6.4.1	Tanzanian study	70
6.4.2	Philippines study	71
6.4.3	Conclusions	72

7	Facilities for calf and heifer rearing in the tropics	73
7.1	Stock welfare	74
7.1.1	The five basic freedoms of livestock	74
7.1.2	The six basic elements of stock welfare	75
7.1.3	Other general principles of stock welfare	78
7.1.4	Problems of confinement	79
7.2	Housing calves	79
7.2.1	Selecting the site and shed layout	79
7.2.2	Individual pens	81
7.2.3	Calf cages	82
7.2.4	Group pens	82
7.2.5	Isolation pens	83
7.3	Physical comfort of calves	83
7.4	Types of flooring	83
7.5	Feeding and handling facilities	84
7.5.1	Calf scales	86
7.5.2	Office and staff facilities	86
7.6	Cleaning and sanitising feeding equipment	86
7.6.1	Detergents and disinfectants	88
7.6.2	Using household bleach as a sanitiser	89
7.7	Calf sheds and children	89
8	Milk feeding of calves	91
8.1	Teaching calves to drink	92
8.2	The choice of liquid feeds	93
8.2.1	Colostrum and transition milk	93
8.2.2	Whole milk	95
8.2.3	Milk replacer	95
8.3	The choice of feeding methods	95
8.3.1	Automatic calf feeders	97
8.4	How much milk to feed	98
8.4.1	Benefits of feeding large quantities of milk	101
8.4.2	Specific decisions for the tropics	101
8.5	Weaning age	102
8.6	Other aspects of milk rearing	102
8.6.1	Milk temperature	102
8.6.2	Feeding frequency	102
8.6.3	Milk dilution	103
8.6.4	Antibacterial residues	103
8.6.5	Feeding mastitic milk	104
8.6.6	Labour	104
8.6.7	Pizzle sucking	105
8.6.8	Trying out a new system	105

8.7	Multiple suckling using dairy cows	105
8.7.1	Continuous suckling	106
8.7.2	Restricted suckling	107
8.7.3	Combining restricted suckling and hand or machine milking	108
8.7.4	Pros and cons of restricted suckling versus artificial rearing	108
9	Calf milk replacers	109
9.1	The composition of milk replacers	110
9.2	Describing quality in milk replacers	113
9.2.1	BAMN guidelines for dry powder	114
9.2.2	BAMN guidelines for reconstituted liquid	114
9.3	The nutritive value of milk replacers	114
9.4	The relative cost of milk replacers	116
9.5	Using milk replacers to rear calves	117
9.5.1	The final word on milk replacers	118
10	Solid feeds for milk-fed calves	121
10.1	The nutritive value of solid feeds	122
10.2	Feed intake and calf performance pre-weaning	124
10.3	Feed intake and calf performance throughout the rearing period	125
10.4	Criteria for weaning calves	127
10.5	Tips to stimulate concentrate intakes	128
10.5.1	Palatability	128
10.6	Formulating concentrates for weaned calves	129
10.6.1	Sourcing calf concentrates in Asia	130
11	Disease prevention in calves	131
11.1	Calf scours or neonatal diarrhoea	133
11.1.1	Types of scours	133
11.1.2	Treating scours	134
11.1.3	Controlling scours through management	136
11.1.4	Preventing scours	138
11.2	Pneumonia and other respiratory diseases	138
11.3	Pulpy kidney and other Clostridial diseases	139
11.4	Internal parasites and their control	140
11.5	Johne's disease	141
11.6	Other diseases in calves	142
11.6.1	Bloat or tympany	142
11.6.2	Feed toxicities	143
11.6.3	Grain poisoning or acidosis	144
11.6.4	Navel-ill and joint-ill	144
11.6.5	Pink eye	145
11.6.6	External parasites	145
11.6.7	Leptospirosis	146

11.6.8	Lameness	147
11.7	Disbudding and dehorning calves	147
11.7.1	Using caustic potash	147
11.7.2	Using flexile collodion solution	147
11.7.3	Using a hot iron (electrical or charcoal)	148
11.7.4	Using a rubber ring (elastator)	148
11.7.5	Using a scoop dehorner	148
11.8	Calf management and disease	148
11.8.1	Vaccinate and rest easy	149
11.9	How to recognise sick calves	151
11.9.1	Signs to look for	151
11.9.2	Keep records to help identify problems	151
11.10	What should you do with sick calves?	152
11.10.1	Assisting the veterinarian	152
11.10.2	Their long-term future	153
11.10.3	Overuse of antibiotics	154
11.10.4	Probiotics	155
11.11	Maintaining a healthy calf shed	155
11.11.1	Responsible drug handling	156
11.11.2	Biosecurity when purchasing new stock	157
11.11.3	Animal and human health	158
12	Communicating with the calf	159
12.1	Signals to watch for	160
12.2	Changes in normal calf behaviour symptomatic of stress	162
12.3	The many types of calf scours	165
12.4	Visual changes in calves symptomatic of stress	166
12.5	Understand how calves react to people	169
12.6	Communicate with your calf rearer too!	170
12.6.1	Developing standard operating procedures	171
12.7	Contract calf rearing	172
12.8	Codes of animal welfare for calves	173
12.8.1	Housing	173
12.8.2	Feeding	174
12.8.3	Management practices	174
12.8.4	Transportation of calves	175
13	Post-weaning management of dairy heifers	177
13.1	On-farm rearing of replacement dairy heifers	178
13.2	Benefits of heavier heifers	182
13.3	Targets for growing heifers	183
13.3.1	Target pre-calving live weights	183
13.3.2	Target in-calf live weights	183
13.3.3	Target growth rates	185

13.3.4	Target chest girths and wither heights	185
13.3.5	Target first lactation milk yields	186
13.3.6	Age of teeth eruption	186
13.4	Feeding heifers to achieve target live weights	186
13.4.1	Grazing versus shedding of growing heifers	189
13.5	Contract heifer rearing	190
13.6	Using dairy stock for beef production	192
14	Mating and calving management of dairy heifers	195
14.1	Mating replacement heifers	196
14.2	Natural mating	198
14.2.1	Bull management for natural mating	199
14.3	Artificial insemination	199
14.3.1	Managing artificial insemination	201
14.3.2	Examples of heat synchronisation	202
14.3.3	Sexed semen	203
14.3.4	Targets for heifer mating programs	204
14.4	Calving down replacement heifers	204
14.4.1	The actual birth process	205
14.4.2	Monitoring the actual birth process	205
14.4.3	Assisting the birth process	205
14.4.4	Caring for the newborn calf	208
14.4.5	Cold stress and the newborn calf	211
14.4.6	The 10-point plan for managing the birth process	211
15	The business of calf and heifer rearing	213
15.1	Costing different feeds for calf rearing	215
15.1.1	Feed costs associated with calf rearing in Malaysia	216
15.1.2	A case study of different milk-rearing systems in Vietnam	217
15.2	Other costs for calf and heifer rearing	220
15.2.1	The high cost of diseases in calves	220
15.3	The hidden costs of poor heifer rearing	220
15.4	Measures of lifetime productivity on small holder dairy farms	221
15.4.1	Scenario 1. Assuming zero mortality and culling	223
15.4.2	Scenario 2. After taking into account the impacts of mortality and culling	223
15.4.3	Conclusions	223
16	Assessing current calf- and heifer-rearing practices	225
16.1	Checklists for assessing the system	225
16.1.1	Peri-natal (pre-calving and first 24 hr)	225
16.1.2	Pre-weaning feeding management	227
16.1.3	Pre-weaning herd and health management	227
16.1.4	Weaning process	227
16.1.5	Weaning to first calving	227

16.2	Grading farmer skills in young stock management	228
16.2.1	Objective criteria for grading skills	229
16.2.2	Subjective criteria for grading skills	229
16.3	A shortlist of high-priority calf and heifer practices	229
17	Conducting training programs on improved young stock management	231
17.1	Planning farmer workshops	233
17.1.1	Workshop objectives	233
17.1.2	Developing a workshop program	233
17.1.3	Practical issues when planning the workshop program	236
17.1.4	Associated farm visits	236
17.2	CalfTrack: calf management training system	238
17.2.1	Newborn calf records	238
17.2.2	Animal health records	239
17.3	Additional training material on the internet	241
17.3.1	Attica Veterinary Association	241
17.3.2	US Dairy Calf and Heifer Association	241
17.3.3	Calf and Heifer Adviser	241
17.3.4	Dairy Australia	241
18	Best management practices for rearing young stock	243
18.1	What makes a good calf-rearing system?	244
18.1.1	Herd performance	245
18.1.2	Size of operation	245
18.1.3	First colostrum feeding management	245
18.1.4	Group size	245
18.1.5	Gender of rearer	245
18.1.6	Relationship of rearer to farm owner	245
18.1.7	Time of feeding roughage	245
18.1.8	Feeding mastitic or antibiotic milk	246
18.1.9	Feeding whole milk to calves	246
18.2	Monitoring your calf- and heifer-rearing system	246
18.2.1	Pre-calving (heifer's dams)	247
18.2.2	Post-calving (heifer's dams)	247
18.2.3	Pre-weaning	247
18.2.4	Pre-mating	248
18.2.5	Post-calving	248
18.3	What is best management practice and quality assurance?	248
18.3.1	Planning general herd and heifer management	249
18.3.2	Planning heifer supply programs	250
18.3.3	Planning heifer care from birth to weaning	251
18.3.4	Planning heifer care from weaning to mating	252
18.3.5	Planning heifer mating programs	253
18.3.6	Planning heifer care from mating to calving	254
18.4	Ensuring the relevance of these BMPs to tropical small holder dairy farmers	254

Appendix 1: John Moran's golden rules of calf and heifer rearing	256
Appendix 2: Conversion of units of measurements	258
Appendix 3: Currency converter for South and East Asia	261
Appendix 4: Workshop expectation and evaluation forms	262
Glossary	266
References	272
Index	276