HORNOF

12-20N 102-3r

SI.

Forage Conservation and Feeding

FRANK RAYMOND GORDON SHEPPERSON RICHARD WALTHAM

Illustrations by CHRISTOPHER RAYMOND

0048290

First edition 1972 Second edition 1975 Third (revised) edition 1978 Reprinted 1982

© FARMING PRESS LTD 1975

ISBN 0 85236 084 3

This book is set in 10pt on 11pt Times and is printed in Great Britain on Nimrod Cartridge paper by Bookmag, Inverness Scotland

CONTENTS

CHAPTER	PAGE
FOREWORD By Dr Gordon Dickson, Faculty of Agriculture, University of Newcastle-upon-Tyne	11
1 THE ROLE OF CONSERVATION IN BRITISH FARMING	15
2 THE PRINCIPLES OF CONSERVATION	20
Haymaking—benefits of mechanical conditioning—overheating problems—role of barn drying and hay additives—high temperature dehydration—wilting and dewatering—ensilage—preservation by acid—measures to produce good silage	
3 THE FEEDING VALUE OF CONSERVED FORAGES	36
Digestibility of forages at cutting—D-values and metabolisable energy—feed intake—the intake of hay—differences in intake between forage species—the intake of dried grass—the intake of silage—conserved forages fed in mixed rations—conserved forages and cereals—the protein value of conserved forages—fibre in ruminant rations—the mineral content of conserved forages	
4 CROPS FOR CONSERVATION	54
Advantages of planned crop spread—digestibility levels—crops for hay—crops for silage—forage maize—ensiled kale and crop by-products—crops for dehydration	
5 MOWING AND FIELD TREATMENT	65
Drying in the swath—requirements of mowing and conditioning equip- ment—mower-conditioning—tedding the crop—crushing, crimping and lacerating—types of mowing and conditioning equipment—composite mowing and conditioning units—operating mowing and conditioning equipment—loss of dry matter—drying rates—wilting by treatment with chemicals and other means	
6 HAYMAKING	86
The handling problem—baling hay—density adjustment—baler output—bale handling—handling single bales—group handling systems—automatic sledges—loading into store—overall system output—large bales—hay cubes and wafers—barn hay drying—systems of drying—types of drier—walled storage driers—unwalled storage driers—chopped hay drying—the hay tower	

CHAPTER

PAGE

114

7 SILAGE MAKING

Stage of growth at cutting—dry-matter content—self-loading forage wagons—harvesting maize for silage—trailers with different types of harvester—soil contamination—filling the silo: the Dorset Wedge method—controlling shoulder wastage—avoiding oxidation and heating—loading into silo—consolidation—High Mowthorpe filling procedure—outdoor silos—Silopress—flexible wall silos—silage additives—minimum fermented silage—effluent loss from clamp and bunker silos—ensiling maize—care during storage—towers for silage.

8 GRASS-DRYING

148

Equipment—mobile units—processing equipment—packaging—harvest-grass for drying—transport systems—drier operation and management—reduction of oil consumption—some cost aspects in grass-drying—the grading of dried grass

9 METHODS OF FEEDING

169

Hay—silage—mechanical loading and feeding—complete ration feeding—silo size and capacity—dried grass.

10 FEEDING CONSERVED FORAGES

179

Factors to be considered—planning the feeding layout—feeding young stock—conserved forages for milk production—more effective use of protein—dried grass in dairy rations—conserved forages for beef production—dried grass pellets with silage—dried grass/barley supplement—effect on summer stocking rates—conserved forages for sheep.

11 CONSERVATION IN DIFFERENT FARMING SYSTEMS

194

Ensilage: the main conservation method—barn hay-drying of later growths—big-scale units and tower silos

	PAGE
APPENDICES	
1 Further Reading	201
2 Metric Conversion Table	202
INDEX	204

Forage Conservation and Feeding

FRANK RAYMOND GORDON SHEPPERSON RICHARD WALTHAM

Illustrations by CHRISTOPHER RAYMOND

0048290

First edition 1972 Second edition 1975 Third (revised) edition 1978 Reprinted 1982

© FARMING PRESS LTD 1975

ISBN 0 85236 084 3

This book is set in 10pt on 11pt Times and is printed in Great Britain on Nimrod Cartridge paper by Bookmag, Inverness Scotland

CONTENTS

CHAPTER	PAGE
FOREWORD By Dr Gordon Dickson, Faculty of Agriculture, University of Newcastle-upon-Tyne	11
1 THE ROLE OF CONSERVATION IN BRITISH FARMING	15
2 THE PRINCIPLES OF CONSERVATION	20
Haymaking—benefits of mechanical conditioning—overheating problems—role of barn drying and hay additives—high temperature dehydration—wilting and dewatering—ensilage—preservation by acid—measures to produce good silage	
3 THE FEEDING VALUE OF CONSERVED FORAGES	36
Digestibility of forages at cutting—D-values and metabolisable energy—feed intake—the intake of hay—differences in intake between forage species—the intake of dried grass—the intake of silage—conserved forages fed in mixed rations—conserved forages and cereals—the protein value of conserved forages—fibre in ruminant rations—the mineral content of conserved forages	
4 CROPS FOR CONSERVATION	54
Advantages of planned crop spread—digestibility levels—crops for hay—crops for silage—forage maize—ensiled kale and crop by-products—crops for dehydration	
5 MOWING AND FIELD TREATMENT	65
Drying in the swath—requirements of mowing and conditioning equipment—mower-conditioning—tedding the crop—crushing, crimping and lacerating—types of mowing and conditioning equipment—composite mowing and conditioning units—operating mowing and conditioning equipment—loss of dry matter—drying rates—wilting by treatment with chemicals and other means	
6 HAYMAKING	86
The handling problem—baling hay—density adjustment—baler output—bale handling—handling single bales—group handling systems—automatic sledges—loading into store—overall system output—large bales—hay cubes and wafers—barn hay drying—systems of drying—types of drier—walled storage driers—unwalled storage driers—chopped hay drying—the hay tower	

CHAPTER

PAGE

114

7 SILAGE MAKING

Stage of growth at cutting—dry-matter content—self-loading forage wagons—harvesting maize for silage—trailers with different types of harvester—soil contamination—filling the silo: the Dorset Wedge method —controlling shoulder wastage—avoiding oxidation and heating—loading into silo—consolidation—High Mowthorpe filling procedure—outdoor silos—Silopress—flexible wall silos—silage additives—minimum fermented silage—effluent loss from clamp and bunker silos—ensiling maize—care during storage—towers for silage.

8 GRASS-DRYING

148

Equipment—mobile units—processing equipment—packaging—harvest-grass for drying—transport systems—drier operation and management—reduction of oil consumption—some cost aspects in grass-drying—the grading of dried grass

9 METHODS OF FEEDING

169

Hay—silage—mechanical loading and feeding—complete ration feeding—silo size and capacity—dried grass.

10 FEEDING CONSERVED FORAGES

179

Factors to be considered—planning the feeding layout—feeding young stock—conserved forages for milk production—more effective use of protein—dried grass in dairy rations—conserved forages for beef production—dried grass pellets with silage—dried grass/barley supplement—effect on summer stocking rates—conserved forages for sheep.

11 CONSERVATION IN DIFFERENT FARMING SYSTEMS

194

Ensilage: the main conservation method—barn hay-drying of later growths—big-scale units and tower silos

	PAGE
APPENDICES	
1 Further Reading	201
2 Metric Conversion Table	202
INDEX	204

ILLUSTRATIONS

PHOTOGRAPHS

1. Applicator for formic acid

2.	4-drum rotary mower	71
3.	4-disc rotary mower	71
4.	Flail mower	74
5.	Disc mower-conditioner	76
6.	Combined off-set rotary mowing and tedding unit	77
7.	Method of operation of drum mower-conditioner	79
8.	Semi-mounted twin-drum mower-conditioner	79
9.	Random bale collector	93
10.	Automatic bale sledge	93
11.	Automatic bale sledge	94
12.	Automatic packaging machine	97
13.	Fork-lift truck and impaler loader	98
14.	Large round baler	101
15.	Handling round bales	101
16.	Large rectangular baler	102
17.	Using loader to stack large bales	102
18.	Drying large bales in tunnels	106
19.	Vertical central ventilating ducts for drying	109
20.	Tower hay-drier	113
21.	Double-chop forage harvester	. 118
22.	Metered-chop forage harvester	119
23.	Self-loading forage wagon	12
24.	Electrically-controlled chute on forage harvester	12-
25.	Trailer with flared sides	12:
26.	Fixing polythene sheeting to silo side-wall	12
27.	Front-mounted push-off buckrake	13
28.	Grapple fork attachment to buckrake	13
29.	Pulling side sheeting across shoulder of silo	13
30.	Placing polythene sheet across end of silage clamp	13.
	Emptying farmyard manure on top of sheet on silo	13.
32.	Silopress	13
33.	Flexible-walled silo	13

PAGE

35. Unloading silage from bottom of tower	146
36. High-temperature triple-pass rotary drum drier	152
37. Mobile farm batch drier	152
38. Rotary-die press	158
39. Two-stage grass harvesting and hauling system	161
40. Screw press	164
41. Large bales being fed from purpose-built feeder	170
42. Silage block cutter	173
43. Tractor-mounted clamp silo unloader	173
44. Self-unloading forage box	174
45. Lorry-mounted mixer-feeder wagon	175
46. Large-dial weigher on forage box	175
DI CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DEL LA CONTRA DEL CONTRA DE LA CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DE LA CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DE LA CONTRA DE LA CONTRA DE LA	
DIAGRAMS	
Fig. 1. Effect of adding formic acid to silage	34
Fig. 2. Changes in the yield, digestibility and composition of \$24	tyegrass
during first growth	39
Fig. 3. The digestibility of several grass varieties during first grow	with 44
Fig. 4. The yield of several grass varieties when their D-value fall	s to 65% 55
Fig. 5. The yield and D-value of forage maize and D-value of \$2-	4 ryegrass 60
Fig. 6. The daily dry-matter production throughout the year of S	24 ryegrass 63
Fig. 7. Preventing wastage on the 'shoulder' of bunker silos	127
Fig. 8. Stages in filling a bunker silo by the Dorset Wedge method	id 128
Fig. 9. Filling a bunker sito on sloping ground	132
Fig. 10. Sealing an outdoor bunker silo to prevent rain-water entry	133
Fig. 11. Stages in filling an outdoor sealed wedge silo	134
Fig. 12. Using tractor fore-loader to hold silo end-wall while supp	orts are
removed	142
Fig. 13. Layout of single-pass high-temperature grass drier	151

34. Glass-lined steel tower silo

PAGE

146



FOREWORD

by Dr GORDON R. DICKSON
Faculty of Agriculture.
University of Newcastle-upon-Tyne

FOR TOO long our ability to exploit the potential of grassland through conservation and winter feeding of livestock has lagged far behind expertise in the production of herbage and its use through the grazing animal. In this book the authors indicate the means by which this deficiency can be overcome, and in so doing, make a valuable contribution to ensuring the success of our grass-based livestock industry in the more competitive environment into which farming is moving with the advent of EEC membership. Not only is this essential reading for livestock producers, but also for those who seek to benefit from the ley break in arable systems by producing grass products. Furthermore, in reviewing current research and practical innovations, and in indicating likely future developments in conservation and feeding, the authors have compiled a text book of immense value to all who seek greater understanding of this fascinating subject.

May, 1972

Gordon R. Dickson