



# Principles of Cattle Production

HENRY SWAN, PhD  
*Faculty of Agricultural Sciences,  
University of Nottingham*

and

W.H. BROSTER, PhD  
*National Institute for Research  
in Dairying, Reading*

BUTTERWORTHS  
LONDON - BOSTON  
Sydney - Wellington - Durban - Toronto

THE BUTTERWORTH GROUP

ENGLAND

Butterworth & Co (Publishers) Ltd  
London: 88 Kingsway, WC2B 6AB

AUSTRALIA

Butterworths Pty Ltd  
Sydney: 586 Pacific Highway, NSW 2067  
Also at Melbourne, Brisbane, Adelaide and Perth

SOUTH AFRICA

Butterworth & Co (South Africa) (Pty) Ltd  
Durban: 152-154 Gale Street

NEW ZEALAND

Butterworths of New Zealand Ltd  
Wellington: 26-28 Waring Taylor Street, 1

CANADA

Butterworth & Co (Canada) Ltd  
Toronto: 2265 Midland Avenue,  
Scarborough, Ontario, M1P 4S1

USA

Butterworth (Publishers) Inc.  
Boston: 19 Cummings Park, Woburn, Mass. 01801

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, without the written permission of the copyright holder, application for which should be addressed to the publisher. Such written permission must also be obtained before any part of this publication is stored in a retrieval system of any nature.

This book is sold subject to the Standard Conditions of sale of net books and may not be re-sold in the UK below the net price given by the Publishers in their current price list.

First published 1976

ISBN 0 408 70720 8

© The several contributors named in the list of contents, 1976

Library of Congress Cataloging in Publication Data

Easter School in Agricultural Science, 23d, University  
of Nottingham, 1975.  
Principles of cattle production.

Bibliography: p.

Includes index.

1. Cattle--Congresses. I. Swan, Henry.  
II. Broster, W.H. III. Title.  
SF191.2.E17 1975 636.2 75-45462

ISBN 0-408-70720-8

Printed in England by Chapel River Press, Andover, Hants.

**PRINCIPLES OF  
CATTLE PRODUCTION**

**SOIL ZOOLOGY\***

Edited by D.K. McE. Kevan (Butterworths, London, 1955)

**THE GROWTH OF LEAVES\***

Edited by F.L. Milthorpe (Butterworths, London, 1956)

**CONTROL OF THE PLANT ENVIRONMENT\***

Edited by J.P. Hudson (Butterworths, London, 1957)

**NUTRITION OF THE LEGUMES\***

Edited by E.G. Hallsworth (Butterworths, London, 1958)

**THE MEASUREMENT OF GRASSLAND PRODUCTIVITY\***

Edited by J.D. Ivins (Butterworths, London, 1959)

**DIGESTIVE PHYSIOLOGY AND NUTRITION OF THE RUMINANT\***

Edited by D. Lewis (Butterworths, London, 1960)

**NUTRITION OF PIGS AND POULTRY\***

Edited by J.T. Morgan and D. Lewis (Butterworths, London, 1961)

**ANTIBIOTICS IN AGRICULTURE\***

Edited by M. Woodbine (Butterworths, London, 1962)

**THE GROWTH OF THE POTATO\***

Edited by J.D. Ivins and F.L. Milthorpe (Butterworths, London, 1963)

**EXPERIMENTAL PEDOLOGY\***

Edited by E.G. Hallsworth and D.V. Crawford (Butterworths, London, 1964)

**THE GROWTH OF CEREALS AND GRASSES\***

Edited by F.L. Milthorpe and J.D. Ivins (Butterworths, London, 1965)

**REPRODUCTION IN THE FEMALE MAMMAL\***

Edited by G.E. Lamming and E.C. Amoroso (Butterworths, London, 1967)

**GROWTH AND DEVELOPMENT OF MAMMALS**

Edited by G.A. Lodge and G.E. Lamming (Butterworths, London, 1968)

**ROOT GROWTH\***

Edited by W.J. Whittington (Butterworths, London, 1968)

**PROTEINS AS HUMAN FOOD**

Edited by R.A. Lawrie (Butterworths, London, 1970)

**LACTATION**

Edited by J.R. Falconer (Butterworths, London, 1971)

**PIG PRODUCTION**

Edited by D.J.A. Cole (Butterworths, London, 1972)

**SEED ECOLOGY**

Edited by W. Heydecker (Butterworths, London, 1973)

**HEAT LOSS FROM ANIMALS AND MAN: ASSESSMENT AND CONTROL**

Edited by J.L. Monteith and L.E. Mount (Butterworths, London, 1974)

**MEAT**

Edited by D.J.A. Cole and R.A. Lawrie (Butterworths, London, 1975)

*\*These titles are now out of print*

## PREFACE

Previous Easter Schools studied in depth various very specific aspects of agricultural production. Some 8 meetings were devoted to topics directly bearing on or allied to animal production: digestive physiology and nutrition of the ruminant; reproduction in the female mammal; growth and development of mammals; lactation; meat; heat losses from animals and man; assessment and control. The Proceedings of these meetings have been widely acknowledged as authoritative statements on the problems considered and valuable contributions to agricultural science. Such specialist conferences have much to recommend them as focal points of knowledge but the individual parts of the subject need to be consolidated into the whole. With rapid progress in animal science on a wide front it is all too easy for research workers to lose sight of developments in subjects not immediately akin to their own and for the adviser, the teacher and the student to feel the lack of a comprehensive up-to-date appraisal of the state of the industry. It was considered advantageous therefore to provide at the 23rd Easter School an overall viewpoint of the cattle industry. The same incisive quality was sought in keeping with the hallmark of earlier programmes, but the scope would be greater and the individual facets smaller than hitherto.

Scientists actively engaged in various major aspects of cattle production were asked to present their specialised topic in the general context of the industry. Selective forward looking interpretations of the *status quo* were sought indicating current main lines of thought, advances and gaps in knowledge, rather than comprehensive reviews of past achievements.

In 6 sessions the Conference discussed first the state of the Industry, followed by reproduction, nutrition, productive processes, foods, and breeding. Each session was fortunate to have a world authority as chairman: Sir Richard Trehane, Professor G.E. Lamming, Professor D.G. Armstrong, Dr K.L. Blaxter, F.R.S., Dr C.C. Balch, Dr P.N. Wilson, who led vigorous and informed discussions, regrettably not detailed in this volume for reasons of economy in printing. A gratifyingly large audience was thus provided with a stimulating synopsis of both Beef and Dairy sectors of the Industry.

The organisers wish to thank the University of Nottingham and Professor Ivins and his staff for their enthusiastic support without which the Schools could not succeed, and the various Companies whose financial contributions allowed the gathering together of cattle specialists from the four corners of the earth.

H. Swan  
W.H. Broster

## ACKNOWLEDGEMENTS

The organisers wish to thank the staff at the University of Nottingham, the Speakers and the Chairmen who all contributed to the success of the meeting. The following Organisations made donations without which the meeting could not have taken place:

B.O.C.M. Silcock Ltd  
Bourbon Products Ltd  
Cooper Nutrition Products Ltd  
Hoechst Pharmaceuticals  
Lilly Research Centre Ltd  
Milk Marketing Board  
Pauls & Whites Foods Ltd  
Pfizer Central Research  
W. & J. Pye Ltd  
RHM Animal Feed Services Ltd  
Rumenco Ltd  
Smith Kline & French Laboratories Ltd  
Spillers Ltd  
W.F. Tuck & Sons Ltd  
United Molasses Trading Co. Ltd

## CONTENTS

1	THE STRUCTURE OF THE BRITISH CATTLE INDUSTRY	1
	J.A. Craven, <i>Milk Marketing Board</i> J.B. Kilkenny, <i>Meat and Livestock Commission</i>	
2	SYNCHRONISATION OF OESTRUS AND OVULATION IN CATTLE	45
	H.D. Hafs, <i>Michigan State University, U.S.A.</i> J.G. Manns, <i>University of Saskatchewan, Canada</i> G.E. Lamming, <i>University of Nottingham</i>	
3	MULTIPLE OVULATION, EGG TRANSPLANTATION – TOWARDS TWINNING	59
	R. Newcomb and L.E.A. Rowson, <i>A.R.C. Unit of Reproductive Physiology and Biochemistry</i>	
4	THE PHYSIOLOGICAL INTERRELATIONSHIP OF REPRODUCTION, LACTATION AND NUTRITION IN THE COW	85
	Henry Swan, <i>University of Nottingham</i>	
5	THE INFLUENCE OF THE CLIMATIC ENVIRONMENT ON METABOLISM IN CATTLE	103
	A.J.F. Webster, <i>The Rowett Research Institute</i>	
6	ENERGY SUPPLY FROM THE DIGESTIVE TRACT OF CATTLE	121
	J.D. Sutton, <i>National Institute for Research in Dairying</i>	
7	PROTEIN SYNTHESIS IN THE RUMEN: ITS IMPLICATION IN THE FEEDING OF NON-PROTEIN NITROGEN TO RUMINANTS	145
	P.J. Buttery, <i>University of Nottingham</i>	
8	ENERGY UTILISATION IN THE BODY	169
	E.F. Annison, <i>Sydney University, Australia</i>	



9	AMINO ACID SUPPLY AS A LIMITING FACTOR IN MILK AND MUSCLE SYNTHESIS T.B. Mepham, <i>University of Nottingham</i>	201
10	NUTRITIONAL INFLUENCES ON MILK QUALITY J.A.F. Rook, <i>Hannah Research Institute</i>	221
11	FACTORS INFLUENCING THE EFFICIENCY OF ENERGY UTILISATION BY BEEF AND DAIRY CATTLE A.J.H. van Es, <i>Institute for Livestock Feeding and Nutrition Research, Netherlands</i>	237
12	MEETING THE ENERGY AND PROTEIN REQUIRE- MENTS OF THE GROWING ANIMAL M. Kay, <i>The Rowett Research Institute</i>	255
13	PLANE OF NUTRITION FOR THE DAIRY COW W.H. Broster, <i>National Institute for Research in Dairying</i>	271
14	FACTORS INFLUENCING VOLUNTARY FOOD INTAKE IN CATTLE J.A. Bines, <i>National Institute for Research in Dairying</i>	287
15	UTILISATION OF GRASSLAND BY DAIRY COWS J.D. Leaver, <i>National Institute for Research in Dairying</i>	307
16	BEEF FROM GRASS AND FORAGE CROPS J.M. Wilkinson, <i>The Grassland Research Institute</i>	329
17	CONSERVED FORAGE -COMPLEMENT OR COMPETITOR TO CONCENTRATES J.C. Tayler and R.J. Wilkins, <i>The Grassland Research Institute</i>	343
18	SELECTION FOR MILK AND BEEF CHARACTER- ISTICS - COLLATERAL OR INDEPENDENT? C.J.M. Hinks, <i>Animal Breeding Research Organisation</i>	365

19	THE GENETIC IMPLICATIONS OF SELECTING CATTLE FOR LARGE SIZE G.W. Seifert, <i>Tropical Cattle Research Centre, Australia</i> T.H. Rudder, <i>Queensland Department of Primary Industries, Australia</i>	373
20	PRACTICAL BEEF CATTLE IMPROVEMENT R.L. Willham, <i>Iowa State University, U.S.A.</i>	387
21	THE FUTURE – MILK VERSUS BEEF OR MILK AND BEEF D.M. Allen, <i>Meat and Livestock Commission</i>	405
	LIST OF DELEGATES	419
	INDEX	435

# THE STRUCTURE OF THE BRITISH CATTLE INDUSTRY

J.A. CRAVEN

*Milk Marketing Board*

J.B. KILKENNY

*Meat and Livestock Commission*

## Summary

The output of the milk and beef industries represented 34 per cent of the total agricultural output for the United Kingdom in 1974. Increasing home production of both meat and milk in recent years has enabled significant reductions to be made in terms of imports. Home produced beef increased by 226,000 tonnes and milk production by 2,718 million tonnes since 1960. Beef cow numbers more than doubled between 1960 and 1974; however, most of the increase in milk production was due to an increase in milk yield cows. These trends however, were sharply reversed in 1973/74 as production costs escalated and the profitability of both enterprises suffered a serious set-back. However, although the recent reductions in cattle numbers have been significant, they ought to only reflect a transitional phase in the longer term expansion of both industries.

As producer numbers have fallen dairy herd size has increased significantly. However, the vast majority of dairy farms are under 100 acres and concentrated in the western part of the country. Beef herds are appreciably smaller in size but the trend is towards larger scale enterprises.

The breed structure of the national dairy herd continues to move in favour of the Friesian at the expense of the other dairy breeds. The majority of home produced beef is a by-product of the dairy herd and although the popularity of the Hereford as a crossing bull has been maintained, the Aberdeen Angus has lost ground to the imported Continental breeds such as the Charolais and Simmental. Twenty-five per cent of home produced beef calves come from the beef cow population. Most of these suckler cows are crossbred and increasing use is being made of the beef cross Friesian as the breeding cow. Beef bulls sire two thirds of all calves reared for beef.

There is wide variation in systems of beef production, much of which is still run in a traditional way and as a secondary enterprise. The trend has been towards more intensive systems of production.

Dairying systems are largely based on a level production throughout the year, although there are examples of specific block calving systems. Over 50 per cent of producers still have cowshed systems of housing while only 34 per cent of herds are milked in parlour installations.

The range in technical and economic aspects of production between milk and beef producers is demonstrated by reference to MMB and MLC costed enterprises. It is stressed that technical efficiency is not necessarily directly related to profitability as much will depend upon the overhead cost structure of the farm and the financial commitment involved.

An analysis of dairy costings results by yield group, concentrate use and stocking intensity indicates the relative importance of these physical factors in relation to gross margin results. A comparison of

## 2 The structure of the British cattle industry

physical and financial results between summer and winter producing dairy herds suggests that the level of performance in the summer herds would need to increase substantially before they were able to compete financially with the average winter calving herd.

In beef production the major physical factors determining performance are growth rate and stocking intensity. Choice of breed in relation to system is also an important consideration if acceptable financial results are to be obtained.

As assessment of the future of the industry is inevitably dependent on political decisions, unless there is a clear and long-term return of confidence, there is likely to be retrenchment and a change of emphasis away from expansion and capital investment.

The costs of cereals relative to the prices of milk and beef will determine the speed at which improvement in grassland utilisation proceeds. There can be little doubt that in terms of use of resources, an accelerated drive towards greater grassland production will provide the best economic return on a national basis.

The purpose of this chapter is first to describe the present structure of, and recent changes and trends in the British Cattle Industry - dairy and beef. Future changes in the balance of beef and dairy, the level of expansion, and the arguments for import saving are largely political issues, involving not only the Government but the EEC. The arguments for different courses of action will not be presented here, rather the second part of the chapter will concentrate on examining some of the main technical and economic aspects of milk and beef production.

The value of output of milk and milk products and fat cattle and calves has increased in recent years reaching an estimated £1,289 m at the farm gate in 1973/74 (*Table 1.1*) - 34 per cent of total agricultural output. Their combined value as a proportion of total output has remained relatively stable, although the balance has changed in favour of beef.

**Table 1.1** United Kingdom beef and milk output (£ m) per annum

	1965/66	1970/71	1972/73	1973/74
Fat cattle and calves	271	388	530	607
Milk and milk products	406	512	642	682
Total livestock output	674	913	1,188	1,284
Total agricultural output	1,886	2,372	2,947	3,773
Fat cattle and calves as percentage of total agricultural output	14	16	18	16
Milk and milk products as percentage of total agricultural output	22	22	22	18

Source: Annual Reviews of Agriculture

## Production

### BEEF

Beef production has increased substantially since 1960, the average annual production between 1970 and 1974 was approximately 950,000 tonnes. Home-produced beef accounted for 80 per cent (net of exports from UK) of total UK beef supplies in 1974, the highest level ever (*Table 1.2*).

**Table 1.2** Cattle slaughterings and beef production in the United Kingdom

<i>Head (000)</i>	<i>1960</i>	<i>1965</i>	<i>1970</i>	<i>1974</i>
Steers and heifers	3,011	2,601	2,896	3,110
Cows and bulls		589	791	986
Calves		387	356	443
<b>TOTAL</b>	<b>3,870</b>	<b>3,577</b>	<b>4,043</b>	<b>4,539</b>
<i>Beef production (000 tonnes)</i>				
Beef and veal	820	819	932	1,046
% self sufficiency (net of exports from UK)	N.A.	74	78	80

Source: MLC Statistics

A further small increase in production of some 5,000 tonnes is projected for 1975 compared with 1974 and a reduction of about 50,000 tonnes between 1975 and 1976. However, 1976 projected production is still considerably higher than UK production levels up to 1973.

Imports of beef and veal fell during the 1960s but have tended to hold their level since 1970, full details are given in *Appendix Table 1*. Imports of beef accounted for about 20 per cent of total consumption in 1974. The balance of the type of beef imports has changed markedly since 1968, approximately two thirds of total beef imports are as boneless meat; frozen bone-in beef only accounts for approximately 2 per cent of current imports.

Imports of live cattle have fallen over recent years but Irish store cattle continue to make a significant contribution to beef production.

In recent years the UK has become a significant exporter of live cattle and beef mainly to the EEC, and there should be potential scope for the UK to increase further its exports of beef to the European market. In addition there would seem to be good potential for developing an export trade in suckled calves and stores, produced in upland and hill areas, for finishing in the maize silage units of Europe.

**Table 1.3** Total milk equivalent<sup>3</sup> of United Kingdom annual imports and production of milk and milk products

Calendar years	Whole milk used for liquid consumption and milk products					
	Net imports <sup>2</sup>	Home production <sup>4</sup>	Total	Home production as % of total consumption	Home produced whole milk used for milk products	Home production as % of total used for milk products
	Million litres			Million litres		
1960	11,215	10,379	21,594	48	3,291	23
1965	12,370	11,079	23,449	47	3,610	22
1970	11,243	12,029	23,272	52	4,569	29
1971	10,824	12,365	23,189	53	4,992	32
1972	10,033	13,220	23,253	57	5,814	37
1973	9,188	13,470	22,658	59	5,946	39
1974 <sup>1</sup>	11,824	13,097	24,921	52	5,396	31

Source: UK Dairy Facts and Figures 1974, published by Federation of UK Milk Marketing Boards

<sup>1</sup>MMB Department of Economics provisional estimate

<sup>2</sup>The figures of net imports are the milk equivalents of imports after deducting the milk equivalents of exports and re-exports and from 1965 include butter oil

<sup>3</sup>The milk equivalent of net imports has been calculated by applying appropriate milk conversion factors to the Customs and Excise statistics of UK imports, exports and re-exports of the products concerned. From 1970 the following factors have been used (litres of milk per tonne of product) – butter 23,640, cheese 10,450, condensed milk and chocolate crumb 2,640, whole milk powder 8,180, fresh cream 13,180, sterilised cream 6,180

<sup>4</sup>Home production figures relate to sales of milk off farms and exclude milk retained on farms for home consumption, animal feeding or manufacture into butter or cream

## MILK

The UK is likely to continue to be a net importer of milk products in the foreseeable future. Over the last 15 years however, home production has been increasing as a proportion of total consumption (*Table 1.3*), although the most recent figures show a sharp reversal in this trend. This is due to a combination of increased demand because of consumer subsidies and lower production due to a drop in both cow numbers and yield per cow. Hopefully this is a transitory situation and provided reasonable profitability returns to the industry, the longer term trend towards increasing self sufficiency should continue. Details of production and imports for individual milk products are given in *Appendix Table 2*. Butter is the milk product in which the UK is least self sufficient.

## Consumption

## BEEF

Consumption of beef has fallen over the last few years in the UK after having been at a fairly constant level, but in 1974 this trend was reversed. This contrasts with a steady increase in consumption in many other countries; the increase in consumption in Italy is particularly striking. The average level of consumption in France is currently 7 kg per head more than in the UK (*Table 1.4*).

**Table 1.4** Per head consumption of beef and veal in selected countries (kg per head per annum)

	1967	1969	1971	1973	1974
United Kingdom	24	24	23	21	25 <sup>1</sup>
Western Germany	23	24	25	23	—
France	30	30	30	28	—
Italy	26	24	26	28	—
USA	50	52	53	51	—

Sources: Die Agrarmärkte 1973. BR Deutschland EWG und Weltmarkt. Vieh und Fleisch. Zentrale Markt und Preisbereichsstelle (ZMP), Bonn and <sup>1</sup>MLC Provisional figures

## MILK

The demand for liquid milk and milk products in the UK is high relative to most other countries (*Table 1.5*). The consumption per capita figures are inevitably influenced by product prices and with an increasing subsidy payment within the UK market, it could be argued that consumption is artificially high and that it could be expected to drop if consumer subsidies were reduced or withdrawn.

## 6 The structure of the British cattle industry

**Table 1.5** Estimated average consumption per head of liquid milk, cream, butter and cheese in certain countries

	Liquid milk and cream (milk equivalent) litres		Butter kg		Cheese kg	
	1972	1973	1972	1973	1972	1973
United Kingdom	153	155	7.2	8.0	5.4	9.8
Western Germany	99	95	7.1	7.2	6.1	6.1
France	76	N.A.	8.5	8.8	14.4	15.0
Italy	70	N.A.	1.9	N.A.	10.9	N.A.
USA	116	114	2.2	2.2	6.0	6.1
Sweden	206	N.A.	4.9	4.4	8.7	9.1

Source: Dairy Facts and Figures

### Cattle Numbers

There are about 15¼ million cattle in the UK, 10.9 million in England and Wales, 2.7 million in Scotland, 1.6 million in Northern Ireland and the total number has been increasing over the last decade (*Table 1.6*). Of the total cattle population 35 per cent are breeding cows. Dairy cows account for 64 per cent of the breeding cows, the remaining 36 per cent being beef cows.

**Table 1.6** Total cattle numbers – United Kingdom June Census – 1960-1974 (000 head)

	1960	1965	1970	1974	Per cent change 1960 to 1974
Dairy herd	3,165	3,187	3,243	3,382	+ 6.8
Beef herd	848	1,018	1,300	1,898	+ 123.8
TOTAL COWS	4,013	4,205	4,543	5,280	+ 31.6
<i>Heifers in calf (1st)</i>					
Dairy herd	822	621	696	656	
Beef herd		139	167	287	
<i>Other cattle and calves</i>					
2 year old or over	1,313	978	861	969	- 26.2
1 year to 2 year	2,675	2,524	2,658	3,486	+ 30.3
Under 1 year	2,857	3,384	3,564	4,462	+ 56.2
TOTAL CATTLE	11,680	11,851	12,581	15,241	+ 30.5

Source: Ministry of Agriculture, Fisheries and Food, London (MAFF), and MLC Provisional estimates

### CHANGE IN CATTLE NUMBERS IN 1974

The significant drop in profitability for both milk and beef producers and the accompanying lack of confidence have had a marked effect on cattle numbers. The December 1974 Census figures showed that the dairy herd had fallen by 138,000 cows and the beef herd had been reduced by 96,000 cows compared with the December 1973 Census results. This represented a fall of 4.7 per cent and 10.0 per cent in dairy and beef cow populations respectively.



Artificial insemination figures have reflected the reduced cow numbers and in the year ended March 1974 a fall of 2.4 per cent (47,728 inseminations) was recorded in dairy herds serviced by the Milk Marketing Board. This drop followed increases of 5.8 per cent and 7.4 per cent in the previous two years. In addition to this fall in demand there has been a marked swing from dairy to beef inseminations. During the year ended March 1974 dairy inseminations fell by 91,221 (6.8 per cent) whereas beef inseminations rose 43,245 (6.5 per cent). There was also a marginal increase in dual purpose breed inseminations.

The reasons for this swing are not easy to pinpoint, although the major factors are probably a realisation that already too many young stock were being reared on dairy farms and that crossbred beef calves especially those characteristically colour-marked would realise more cash even in a depressed calf market. If confidence and expansion return to the dairy sector, there could be a corresponding shortage of heifer replacements in 2 years' time. Trends in cow numbers tend to follow a cyclical pattern as the economics and profitability of the enterprise alter.

*Table 1.7* shows a crude culling rate figure for the national herd (i.e. annual cow slaughterings as a percentage of breeding herd at the end of the previous year). The average rate in the 1960s was just over 16 per cent and it fell in 1972 and 1973 to just under 15 per cent. In 1974 cow slaughterings increased and the culling rate was about 19 per cent. However, this increase must be put into the context that some increase in culling was to be expected after two years of low culling.

The numbers of calves slaughtered are also given in *Table 1.7*. In 1973 calf slaughterings dropped below the 3 per cent level, in 1974 slaughterings have increased substantially up to 8 per cent. However this figure is below the overall average of 13.3 per cent in the 1960s and not very different from 1970. Undoubtedly calf slaughterings reached such a low level in 1973 that calves unsuitable for beef production were retained. A level of around 350,000 calf slaughterings is probably quite acceptable in this context.

**Table 1.7** Cow culling rates and calf slaughterings

	1961	1965	1970	1972	1973	1974
<i>Cow culling rates</i>						
('000)	628	589	791	706	745	1,025
Percentage <sup>1</sup>	15.1	13.8	17.4	14.9	14.8	19.2
<i>Calf slaughterings</i>						
('000)	921	387	356	154	141	436
Percentage <sup>1</sup>	22.1	9.1	7.8	3.2	2.8	8.2

Source: MLC

<sup>1</sup>Number slaughtered as a percentage of total cow numbers in the December Census of the previous year