



**AgEcon** SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*



Centre for Agricultural Strategy



Farm Animal Care Trust

# Sustainable livestock farming into the 21st century

Edited by B J Marshall

STP  
SF61  
.S77x  
1992

CAS Paper 25

February 1992

ST. PAUL CAMPUS  
LIBRARY



ST PAUL CENTRAL LIBRARY  
NOV. 6. 1997 11:32 HS2

ITEM: 3 1951 D00 510 643 8

TO: 2UC SA02 14 724Z BV

DUE: FEB. 5. 1998 TIME:23:59

Sustainable livestock farming  
into the 21st century : procee

W

# UNIVERSITY OF MINNESOTA

## FINE RATES

Overdue book fines . . . . . \$ .50 per day/\$15 maximum

### Recall fines:

Patron recall . . . . . \$1 per day/\$20 maximum

Reserve recall . . . . . \$5 per day/\$50 maximum

Overdue periodical fines . . . . . \$3 per day/\$15 maximum

*NOTE: Fine rates may be higher on  
some types of material.*

## RECEIPTS

Receipts can be requested for books  
returned or renewed in person at a  
Circulation Desk.

CAS Paper 25

# Sustainable livestock farming into the 21st century

Proceedings of a conference organised jointly by the Centre for Agricultural Strategy and the Farm Animal Care Trust held at The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG on 12 September 1991.

**Edited by B J Marshall**

Centre for Agricultural Strategy  
University of Reading  
1 Earley Gate  
Reading RG6 2AT

February 1992

ISBN 0 7049 0639 2  
ISSN 0141 1330

Printed at the College of Estate Management, Reading

Originally established by the Nuffield Foundation in 1975, the **Centre for Agricultural Strategy** is a self-financing unit within the Faculty of Agriculture and Food at the University of Reading.

#### STAFF

<i>Director</i>	Professor J S Marsh
<i>Consultant Director</i>	Professor C R W Spedding CBE
<i>Assistant Director</i>	Dr J C Tayler
<i>Personal Assistant to the Director</i>	Miss P J A Whittome
<i>Senior Research Fellows</i>	Dr S P Carruthers Mr J C Peters Mr R B Tranter
<i>Research Fellows</i>	Mrs G M Craig Mr P J Jones Mrs F A Miller
<i>Research Associate</i>	Mrs T E Wise
<i>Secretaries</i>	Mrs M H Baker Mrs R M J Hague
<i>Honorary Research Fellows</i>	Dr J T Done Dr K A Hassall Mr B J Marshall Dr P J Smith Mr P H Starkey Professor Tilo L V Ulbricht
<i>Consultants (part-time)</i>	Professor A K Giles Dr A J Errington Mr R M Bennett Department of Agricultural Economics and Management, University of Reading  Professor D R Harvey Department of Agricultural Economics and Food Marketing, University of Newcastle upon Tyne  Dr T Rehman Department of Agriculture, University of Reading



The **Farm Animal Care Trust (FACT)** was the first charity set up to improve the welfare of farm animals from birth to slaughter. The Trust recognises that while it is important to draw attention to the animal welfare shortcomings of many current practices and techniques, this achieves little where no practical alternatives are available. The whole emphasis of the Trust has therefore been on encouraging and developing such alternatives.

To achieve this the Trust aims to initiate, promote, and give financial assistance to scientific research which identifies and develops practical and acceptable solutions to welfare problems associated with farm animals; and to bring the results of such research to the attention of the agricultural community, policy makers and the media.

Research and development sponsored by FACT includes a major project on practical alternatives to white veal production, which enabled the Government to ban veal crates in 1990. Others developed the pig family pen system (where piglets remain in the family unit until slaughter), and appropriate winter housing for sheep. The Trust has also contributed funding to the development of more humane slaughter techniques, including a competition for the design of a new cattle stunning pen.

In 1987 the Trust set up a Dex Harrison Memorial Scholarship, the first award being given to work on the potential for integrating livestock with trees. From time to time FACT also contributes funding to symposia which aim to give a practical impetus to change.

#### FACT OFFICERS

<i>Patron</i>	The Hon Dr Miriam Rothschild, CBE, FRS
<i>Chairman</i>	Mrs Ruth Harrison, OBE
<i>Secretary</i>	Mrs Louisa Hawken
<i>Trustees</i>	Professor Donald Broom Professor Andrew Fraser Mr Clive Hollands Dr David Sainsbury

#### ADDRESS

34 Holland Park Road, London W14 8LZ

## Preface

In promoting this Conference jointly with the Farm Animal Care Trust, the Centre is fulfilling one of its most important functions; to identify a major issue and provide a forum for communication and debate. The issue addressed on this occasion is 'sustainable livestock farming', an important element in the current wider debate on the pressures for changes towards organic, less intensive, and more environmentally aware systems of farming. This Conference looks ahead well into the next Century at the wide range of complex and inter-acting factors and their implications. As such it makes a contribution towards the development of appropriate strategies by Government and all the interests concerned with agriculture.

Sustainability can bear many different meanings and definitions – perhaps the simplest might be 'meeting the needs of the present generation without damage to the prospects of future generations'. In planning the structure and content of this Conference however, the organising bodies' took a more specific approach, in which they recognised that a sustainable livestock system has to be biologically sound, morally and politically acceptable, and economically viable, ensuring an adequate supply of food and an adequate income for those who produce it.

The introductory address, the six excellent papers, and the discussions on them reported here, outline the emerging scientific and technical options available to provide food for an expanding global population into the future. They identify and discuss the constraints and pressures – environmental, economic, animal health and welfare – that will determine the ability of livestock production systems to evolve in a sustainable direction. Global driving forces affecting livestock farming, the distribution and degradation of natural resources, and international trade dimensions, are assessed. The

technical, social and political choices facing farmers in developing countries and the need to select the appropriate technologies for livestock production are emphasised. The relevance of strategies and options for sustainable livestock farming systems in the longer term based primarily on European practices and research is reviewed.

We believe this conference and the proceedings published herein, will make a valuable contribution to the discussion of the issues and principles of sustainable livestock systems. They take account of many conflicting but genuinely held shades of opinion which have to be carefully considered if balanced guidelines are to be made. We owe much to the speakers who may understandably have found it difficult in this complex and uncertain area to make predictions, but who nevertheless accepted the challenge and provided a vast range of scientific, technical, economic and statistical material that will undoubtedly help livestock farmers, traders, processors, consumers, researchers and advisers, and administrators and policy makers to analyse the issues and formulate their own decisions about the likely trend of events in the several decades ahead.

We also extend our appreciation to the Farm Animal Care Trust and the Status of Animals Committee, without whose initiative and financial help, it would not have been possible to promote this important and timely conference.

JS Marsh  
Director  
Centre for Agricultural Strategy

# Contents

Preface	5
Abbreviations	9
Opening Address by The Rt Rev Dr Hugh Montefiore	10

## PAPERS

<b>1 RB Heap, DL Ingram and CM Wathes</b>	
Scientific and Technical Options for Sustainable Livestock Production	13
<b>2 NG Gregory</b>	
Developments in Livestock Transport and Slaughter	31
✓ <b>3 CRW Spedding</b>	
Constraints and Pressures on Livestock Farming Systems	51
<b>Discussion 1</b>	61
<b>DM Broom – Chairman</b>	
<b>4 D Norse</b>	
The Global Context; Sharing the World's Resources	66
<b>5 PM Mulvany</b>	
Options for Poor Livestock Farmers in Low Income Countries	79
<b>6 H Vogtmann</b>	
Alternative Strategies for Achieving Sustainable Livestock Production	96

*Sustainability*

**Discussion 2 120**

**JS Marsh – Chairman**

**Appendix**

List of authors 125

Chairmen 126

Centre Publications 127

Sponsorship Scheme 130

# Abbreviations

AFRC	Agricultural and Food Research Council
AFRS	Agricultural and Food Research Service
BST	Bovine Somatotropin
CAS	Centre for Agricultural Strategy
CEC	Commission of the European Communities
DGE	Deutsche Gesellschaft für Ernährung
DNA	Deoxy-ribo-nucleic acid
DOA	Dead on arrival
EC	European Community
EC.G	Electrocorticogram
FACT	Farm Animal Care Trust
FAO	Food and Agriculture Organisation of the United Nations
FAWC	Farm Animal Welfare Council
GDP	Gross domestic product
GH	Growth hormone
hST	Human Somatotropin
IGF	Insulin-like growth factor
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Collaboration and Development
SAGB	Senior Advisory Group on Biotechnology for the European Community
SCP	Single cell protein
SD	Standard deviation
TLU	Tropical livestock units
UN	United Nations
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
VDU	Visual display unit