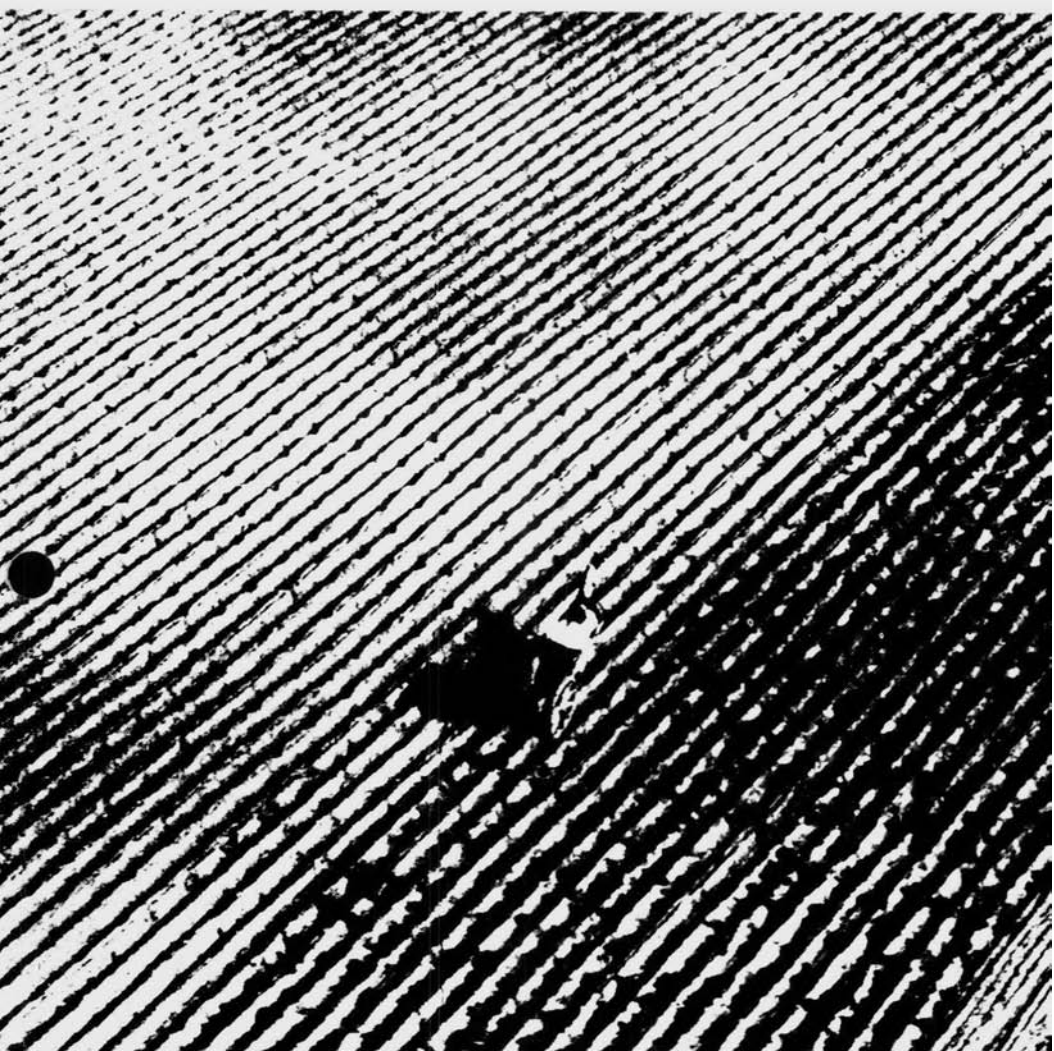


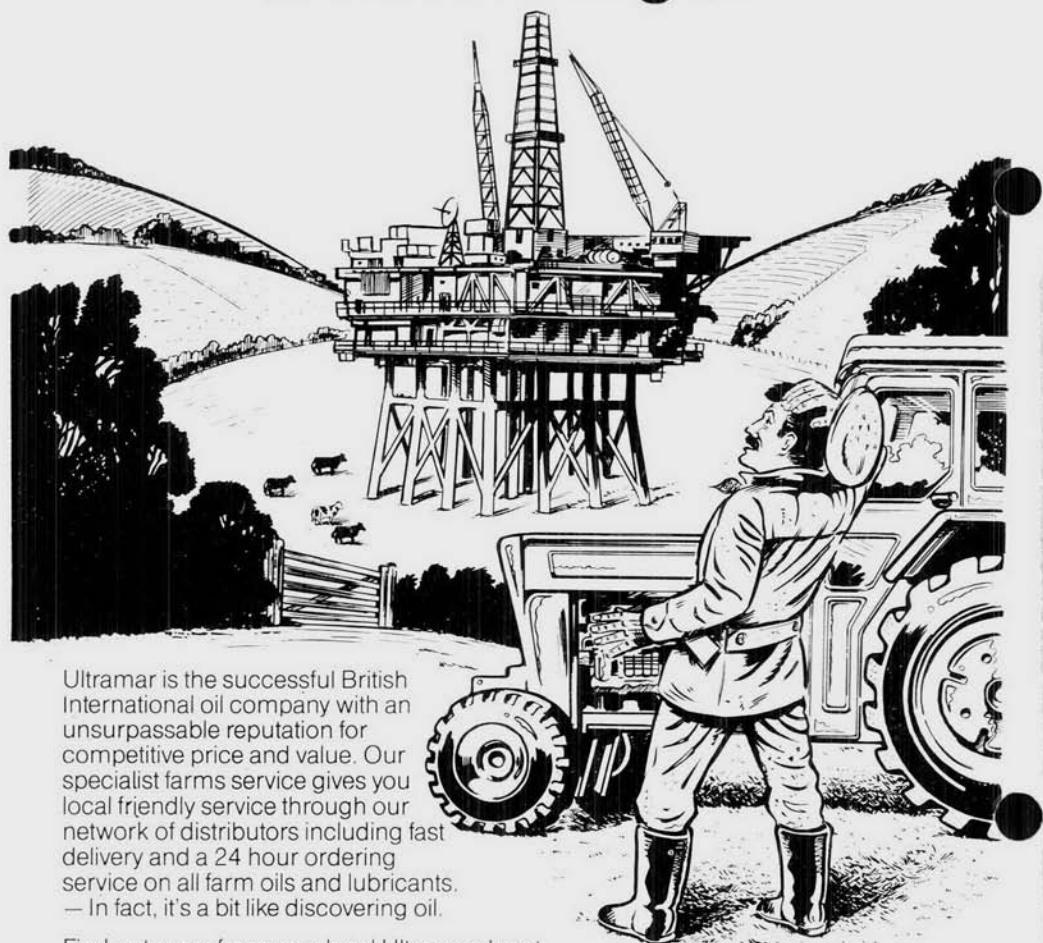


Centre of Management in Agriculture

YEARBOOK 1983/4



Ultramar- About as near as you'll get to discovering oil



Ultramar is the successful British International oil company with an unsurpassable reputation for competitive price and value. Our specialist farms service gives you local friendly service through our network of distributors including fast delivery and a 24 hour ordering service on all farm oils and lubricants. — In fact, it's a bit like discovering oil.

Find out more from your local Ultramar depot (we're in Yellow Pages), or ring Katie Askew on 01-250-3381

Ultramar Golden Eagle Ltd
Pembroke House, 40 City Road, London EC1Y 2AQ



Big enough to matter, small enough to care.



Centre of Management in Agriculture
YEARBOOK 1983/4

**Centre of Management in Agriculture
Management House
Cottingham Road
Corby
Northants
NN17 1TT
Tel: 05363 4222**

**Published by:
Millbank Publications Ltd.
25 Catherine Street
London
WC2B 5JW
Tel: 01-836 1823**

to whom all advertising enquiries should be addressed

Printed by Advertiser Printing Works, Newport, Shropshire.

Gro-Well (Pig Feeds) Ltd.

Hercules Way, Bowerhill Trading Estate,
Melksham, Wiltshire SN12 6TS

Telephone:

MELKSHAM 708482/706993



ANIMAL FOODS
'The Sign of Quality'

Specialists in:

Creep Feeds, Concentrates, Supplements, Compounds, Custom Mixes

Reg Hardy: Melksham 704580/708482

Stephen Tucker: Melksham 708482

Peter Kinley: Swindon 764771

George Witt: Clavering 385

Andy Longwill: Rayleigh 775936

ANDREW WATTS FORESTRY



A.W.F. FENCING

Post and rail, chainlink, post and wire, plain or barbed, all types of panels.

Also tree felling, tree surgery, clearing, planting, pruning etc.

Silverbirches,

Kiln Lane, Binfield Heath,

Nr. Henley-on-Thames, Oxon.

Wargrave 2673

Contents

Viscount Coke of Holkham, President of CMA	5
Nigel Agar CMA Chairman 1981-83	7
Norman Coward CMA Chairman 1983-85	9
CMA Board of Management	11
CMA Executive Committee	15
CMA Membership Committee	15
CMA Journal Committee	19
CMA Education Committee	19
The Centre of Management in Agriculture	21
Education	23
Report of the Journal Committee	25
The British Institute of Management	27
CMA Branches and Honorary Officers	29

ARTICLES

New force in fertilizers	31
Control systems for parasitic gastro-enteritis in cattle	35
Agriculture futures markets by C. H. Prior-Willeard	39
Pressure cleaners on the farm by Terry Joslin	43
Dairy management — milk hygiene by Agricultural Technical Aids	47
Gun care by Mike Barnes, Editor, <i>Sporting Gun</i>	51
Grain drying and storage by I. J. Loynes, BSc, Information Officer, Farm Buildings Information Centre	55
Computers in farming by R. J. Harvey, Unilever Computer Services Ltd.	65
Agricultural machinery by Kenneth Pawley, MIPR, Information Officer, British Agricultural & Garden Machinery Association Ltd.	69
Pest damage is more than chicken food by Peter L. G. Bateman, FRES, Director, Rentokil Ltd.	75
Road haulage and agriculture by Ana Poulton, Road Haulage Association	79
Pest Protection Chemicals, Suppliers & Manufacturers	81
The Land Rover One Ten	87
Weighing on the farm by Hampshire Arable Systems Ltd.	95
Citizens' Band Radio on the farm by James M. Bryant, MIERE, President, Citizens' Band Association	103
CMA Members (by geographical areas)	107
Products & Services Index	119
Index of Advertisers	123

The views expressed in the articles in this publication are those of the authors and not necessarily of the CMA.

Whilst every effort has been made to ensure accuracy in the information published in this Yearbook, the CMA cannot be held responsible for any errors and omissions.

**EDWARDS
BIGWOOD
& BEWLAY**

A COMPLETE RURAL PROPERTY SERVICE

Farm and Estate Management
Sales, Purchases and Valuations
Country Houses and Cottages
Fine Arts and Chattels

13 HORSE FAIR, BANBURY OX16 0AH
0295-50484

Also at Birmingham, London and Stratford-upon-Avon

SLP

BETTER MARKETING IS DIRECT MARKETING.
CATTLE, SHEEP AND PIGS AT ALL STAGES
FROM BIRTH TO SLAUGHTER.
THEN BEYOND THE FARM GATE
TO OUR OWN RETAIL UNITS
IN THE WEST MIDLANDS.

SELECT LIVESTOCK PRODUCERS LIMITED

Metropolitan House, Mardol, Shrewsbury (0743) 50765

and

Church Farm, Northborough, Peterborough (0733) 252 224



Viscount Coke of Holkham President of CMA

Viscount Coke, heir to the Earl of Leicester, succeeds the Duke of Wellington as President of CMA.

Viscount Coke heir to the Earl of Leicester, and a descendant of the famous 18th century agriculturalist Coke of Norfolk, farms 3,000 acres of the 25,000 acre Holkham Estate near Wells-next-the-Sea, Norfolk.

The Chairman of CMA, Nigel Agar, in welcoming the new appointment said: "The Centre is delighted to have Viscount Coke as President, as a working farmer with an interest in all branches of agriculture he possesses a real understanding of the many problems which confront the modern farmer and the many developments which are help-

ing to make agriculture one of the country's most efficient industries".

As well as his interest in farming, Viscount Coke is leader of Kings Lynn and West Norfolk Borough Council; Deputy Lieutenant of the County and an Executive Committee member of the East Anglian Branch of the Historic Houses Association.

He is also President of the Norfolk Boat, a scheme to enable young people to benefit from the discipline of sailing ocean going boats; President of the Wells-next-the-Sea Branch of the R.N.L.I.; the Wells-next-the-Sea Harbour Commission and Chairman of the Burnham Overy Harbour Trust.

Dalton

SUPPLIES LTD



BY APPOINTMENT TO
HER MAJESTY THE QUEEN
MANUFACTURERS OF ANIMAL
IDENTIFICATION EQUIPMENT
DALTON SUPPLIES LTD. NETTLEBED

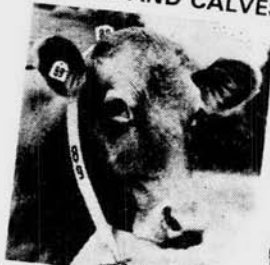
CALFETERIA



N.A.A.S. recommend the Calfeteria teat system. Makes Calf feeding simpler, easier and more profitable. The perfect companion for acidified milk subs. Single unit comprising teat, tubes and bracket £3.33. Non-return ball valve 58p each P&P extra plus VAT.

Dalton

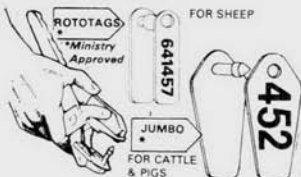
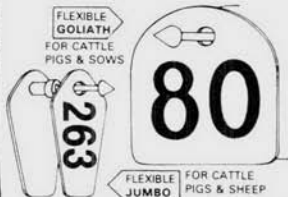
MARKER STRAPS FOR CATTLE AND CALVES



All-round identification. Flexible plastic straps — 5 colours. Embossed two sides, top piece numbering. Adjustable with buckle. Prices: Full size, side numbers, with top piece £2.20 each, or £1.82 VAT. without top piece each, P&P extra plus

Dalton

Easy to fit **EARTAGS**
Easy to read No fuss - No blood



Beware of Imitations

Dalton

SUPPLIES LTD. NETTLEBED
HENLEY-ON-THAMES, OXON
Tel Nettlebed (0491) 641457

STEEL FOR USE IN AGRICULTURE



PIG floors

Weldmesh Pig Floors, made from bright drawn steel wire and welded at every

intersection, are suitable for the intensive rearing of pigs from weaners to heavy hogs. They are self cleaning, hygienic and give over 50 per cent void space. Special sizes can be supplied to suit individual installations.

Plates, Joists, Angles
Channels in stock lengths
or cut to size.
Hollow sections, Tubes
round flats for light
fabrication.

For full details contact:
KASS (Steel Stockholders)
Limited,
Winterton Road,
Scunthorpe.
Tel: (0724) 863241

K

Kass Group



Nigel Agar CMA Chairman 1981-83

"It is my very pleasant task as the current Chairman of CMA to introduce the 1983/84 Yearbook to you.

Your Board have discussed the new lay-out as compared with the last one (1977) and hope you like it, find it interesting, and that it will be useful.

The Centre of Management in Agriculture is in good health; and it is my intention to ensure that this is maintained. Though our original aims and objectives have differed little since the founding of the organisation, past and present members of the CMA Board have nevertheless discussed changes which the Association will find necessary to

meet the requirements of CMA members working in the field of agriculture management during the '80s. I think we can proudly say that with the support of enthusiastic members and staff alike these are now being achieved.

On behalf of those who are involved with the running of CMA may I thank you for your continual support and encourage you to use the wider range of services which are being created. The tremendous response received recently for CMA within the agricultural industry is a clear recognition of the considerable role that CMA, within the British Institute of Management, has in furthering the objectives of farm management".

McGAVOCK CONTRACTS

**BITMAC SURFACING CONTRACTORS
ALSO KERB LAYING AND
GARDEN WALLS BUILT PLUS
GENERAL SITEWORK**

**We work a 50 mile radius. All enquiries are welcome.
Ref. CMI**

**163 CAVEHILL ROAD
BELFAST 15**

Telephone: (0232) 774791

AKC Limited

AGRICULTURAL ACCOUNTING & MANAGEMENT

AKC LTD. is the longest established specialist farm management advisory and accounting practice in the U.K.

- Farm management**
- Farm appraisal and advice**
- Management accounting and budgetary control**
- Impartial advice on farm computer systems**
- Farm organisation and business structure**
- Personnel selection**

Parnella House, Market Place, Devizes, Wilts.

Telephone: Devizes (0380) 4687



Norman Coward CMA Chairman 1983-85

After experience as a general farm worker on a mixed farm in Warwickshire, Mr. Coward graduated with an honours BSc (Agriculture) degree at Wye College (London University), and an M.S. degree in Economics and Business Studies from the University of Illinois. He then worked in the USA on a costings and advisory service, before joining the Milk Marketing Board to run what is now the costings and advisory element of the Farm Management Services. Whilst in that post, he visited New Zealand to make a study and report on the management and profitability of large dairy herds there, and visited South Africa to advise a milk producers organisation on setting up a business recording and advisory service.

In 1970 Mr. Coward joined the staff of Midland Bank Ltd. He is now Senior General

Manager's Assistant (Agriculture). His work involves advising the Bank and its customers on wide-ranging matters of farm finance, including discussion on farm policy and assessment of financial requirements.

After membership of FMA for some years he became Conference Chairman in 1979 holding the post for two years and running in 1980 one of the most successful CMA Conferences held. In 1980 he joined the Board of CMA and was appointed CMA Chairman in October 1983.

Mr. Coward's interests mainly relate to his farming involvement but he also plays squash and badminton ("irregularly and badly") and enjoys classical music and the theatre.



Phoenix Petroleum Ltd.

FARM FUELS and LUBRICANTS

CALL THE COMPANY WHO SPECIALISE
DEPOTS THROUGHOUT EAST ANGLIA

Cambridge 63644
Ipswich 210610

Bury St Edmunds 64830
Great Witchingham 746
(Nr. Norwich)

"THE EAST ANGLIAN FUEL COMPANY"

MANOR PLANT HIRE

COMPLETE RANGE OF SMALL POWER TOOLS
FOR INDUSTRY

- ★ HAMMER DRILLS
 - ★ JIG SAWS
 - ★ HILTI GUNS
 - ★ ARC WELDERS
 - ★ CHAIN SAWS
- etc. etc. . .

You name it, we hire it.

**29 MANOR PARK ROAD, CASTLE BROMWICH,
BIRMINGHAM B36 0DJ.**

Tel: 021-747 2724 or 021-748 2944

CMA Board of Management

N. S. Agar Esq, FBIM
Weston Green Barn
Weston Colville
Cambridgeshire CB1 5NS
022 029 767
Cambridgeshire
Chairman (1981/83)

Norman Coward Esq.
Midland Bank plc
Poultry
London EC2P 2BX
01-606 9911
London
Chairman (1983/85)

R. E. Allathan Esq., MBIM
Hall Hill
Turrieff
Aberdeen
Scotland
088 86 3464
Aberdeen
Co-opted Member

J. M. Atkinson Esq., MBIM
Seale-Hayne Agricultural College
Newton Abbot
Devon TW12 6NQ
0626 2323
Devon
Education Chairman

John Birtles Esq., MBIM
AS Ltd.
NW Bank Chambers
Chipping Norton
Oxon.
0608 2900
Oxfordshire
National Representative

Archie Blyth Esq., FBIM
The East of Scotland College of Agriculture
6 South Oswald Road
Edinburgh EH9 2HH
031-668 1921
Edinburgh
Scotland Representative

A. E. Causton Esq., MBIM
ICI Farm Advisory Service
Doodles, Carrons Lane
Hatfield Broad Oak
Bishops Stortford
Hertfordshire CM22 7HX
027 970 332
Hertfordshire
Conference Chairman

R. J. Dancey Esq., FBIM
MAFF, ADAS, Room 209
Great Westminster House
Horseferry Road
London SW1P 2AE
01-216 6311
London
Co-opted Member

J. H. Deam Esq.
Bolesworth Lake Farm
Tattenhall
Chester
Cheshire
082 925 251
Cheshire
National Representative

D. A. Jordan Esq.
Tranby Croft
Tranby Lane
Anlaby
Hull
East Yorkshire HU10 7EE
0482 657 937
Humberside
National Representative

M. A. A. Lawford Esq.
Clay Farm House
Long Road
Trumpington
Cambridge
0223 841101
Cambridge
Eastern Representative

E. A. K. Lester Esq.
112 Park Road
Kingston
Surrey KT2 S32
01-549 0224
London
BIM Council Member

W. N. Lawton Esq.
Dorset College of Agriculture
Kingston Maurward
Dorchester
Dorset
0305 64182
Dorset
South-West Representative

Gordon Lugg Esq., FBIM
Knighton Farm
Knighton
Swindon
Wiltshire SN6 8NT
079 371 249
Wiltshire
Co-opted Member

D. J. R. Macrae Esq.
51 High Street
Ayton
Middlesbrough
Cleveland
039 02 723056
Cleveland
North-East Representative

J. L. Mills Esq., FBIM
Allied-Lyons plc
156 St. John's Street
London EC1P 1AR
01-253 9911
London
BIM Council Member

Prof. J. S. Nix FBIM
School of Rural Economics and Related
Studies
Wye College
Wye
Nr. Ashford
Kent TN25 5AH
0233 812401
Kent
Journal Chairman

T. W. Roskill Esq, MBIM
Bearwood Farm
Pembroke
Leominster
Herefordshire
054 47 460
Herefordshire
Midland Representative

R. A. Stokes Esq., FBIM
Frogmill Farm
Hurley
Nr. Maidenhead
Berkshire
062 882 3155
Berkshire
National Representative

Derek Wareham Esq., MBIM
Farm Manager
Allied Breweries
Brierley Ct., Brierley
Leominster
Herefordshire HR6 0NU
0568 2580
Herefordshire
National Representative

Luke Wishart Esq.
Church Farm
Binstead
Arundel
West Sussex
0243 551279
Sussex
Membership Committee Chairman

Tread carefully. Change tyres with KENNING.

Kenning's are on hand around the clock to give the farmer an experienced, professional tyre service.

Make sure you have our 'phone number and our literature to hand. Get in touch now!
See yellow pages for your local depot.



**KENNING
TYRE SERVICES**

Manor Offices,
Old Road,
Chesterfield S40 3QT
Tel: (0246) 77241



MARMAX

L. G. MARSHALL

GLENWOOD, NORTH RESTON, LOUTH, LINCOLNSHIRE, LN11 8JD

Telephone: WITHERN (0521) 50212 - 24-Hours

P. CUDMORE - Grimsby 71564

M. D. RICHARDSON - Melton Mowbray 64461

LIQUID FEEDS & FLAVOMYCIN - LIQUID MAGNESIUM - MINERALS - PROTEIN CONCENTRATES
FEED BLOCKS - SALT LICKS - HAY & SILAGE ADDITIVES & SURE SILE INOCULANT
ANIMAL HEALTH PRODUCTS - HORSE FEED

GLASS-REINFORCED CEMENT - WATER TROUGHS - SHEEP DIPS - FOOT BATHS, Etc.

LAND DRAINAGE IN G.R.C. - HEADWALLS - SILT TRAPS - INSPECTION CHAMBERS, Etc.

I.C.P. - PAPER ROLLS, DAIRY & WORKSHOP - OKO TYRE SEALANT - STORAGE TANKS

BIG BALE SILAGE BAGS



SPECIAL DOUBLE WELD



HYDRAULIC CONNECTIONS...

**OFF
THE
SHELF
SERVICE**

GET YOUR OIL
MOVING IN
THE RIGHT
DIRECTION

*We try that little bit harder to give
the Service you require.*

*Our advice is Free and prices
are competitive.*

FLEXIBLE HOSE AND FITTINGS
SPERRY VICKERS EQUIPMENT
FAIREY FILTERS AND ELEMENTS
U.C.C HYDRAULIC ACCESSORIES
STAUFF PIPE CLAMPS,
STEEL TUBE AND COUPLINGS
DANFOSS PUMPS AND MOTORS

A1 HYDRAULICS LTD

1 HIGHMERES ROAD

LEICESTER Telephone: 761131

CHUNNEL PLANT HIRE & CONTRACTORS LTD.



360° EXCAVATORS

Hymac 580D Cat 225
Poclain 75P (Rubber Tyred)

TRACTORS, SHOVELS &
DOZERS

CAT 951, KOMATSU 0.65A & 50P
CASE 580f EXTENDER HOE

MONTABERT 125, 250, 501 (Available
180° & 360° Machines)

DUMP TRUCKS:- VOLVO 860
ROAD SWEEPERS:- LOW
LOADER SERVICE AVAILABLE

Plant Depot: Canterbury Rd., Lydden



SHEPHERDSWELL
(0304) 830014

CMA Executive Committee

Nigel Agar Esq., FBIM
Weston Green Barn
Weston Colville
Cambridgeshire CB1 5NS
022 029 767
Chairman (1981/83)

Bill Lawton Esq.
Dorset College of Agriculture
Kingston Maurward
Dorchester
Dorset

Mike Atkinson Esq., MBIM
Sole-Hayne Agricultural College
Newton Abbot
Devon TW12 6NQ

Gordon Lugg Esq., FBIM
Knighton Farm
Knighton
Swindon
Wiltshire SN6 8NT

Norman Coward Esq
Senior General Manager's Assistant
(Agriculture)
Midland Bank plc
Poultry
London EC2P 2BX

Prof. John S. Nix FBIM
School of Rural Economics and Related
Studies
Wye College
Wye
Nr. Ashford
Kent TN25 5AH

CMA Membership Committee

Luke Wishart Esq.
Church Farm
Binstead
Arundel
West Sussex
(Chairman)

Archie Blyth Esq., FBIM
The East of Scotland College of Agriculture
6 South Oswald Road
Edinburgh EH9 2HH

Tom W. Roskill Esq., MBIM
Bearwood Farm
Pembroke
Leominster
Herefordshire

Break with tra

If there are jobs around your farm that you can't tackle efficiently with traditional farm machinery, take a look at how our range of Case and Poclain machines can help you.

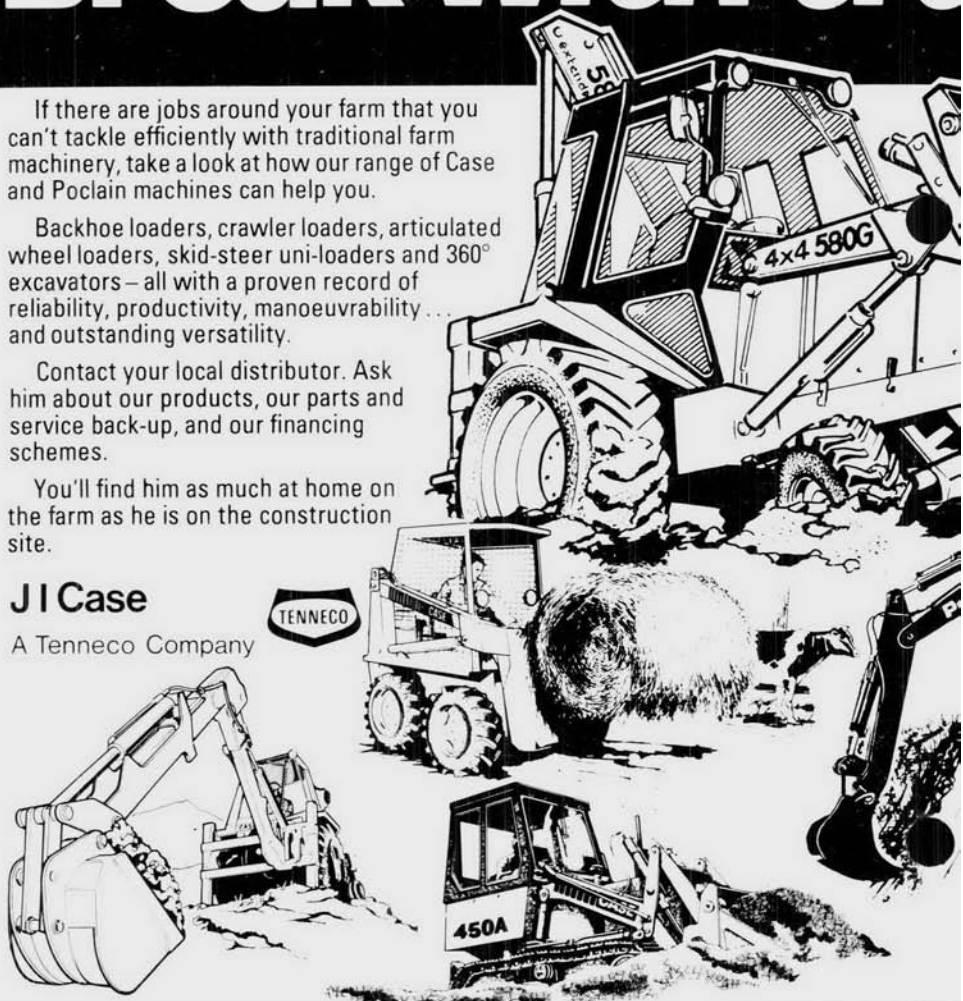
Backhoe loaders, crawler loaders, articulated wheel loaders, skid-steer uni-loaders and 360° excavators – all with a proven record of reliability, productivity, manoeuvrability... and outstanding versatility.

Contact your local distributor. Ask him about our products, our parts and service back-up, and our financing schemes.

You'll find him as much at home on the farm as he is on the construction site.

J I Case

A Tenneco Company



Case



Poclain

dition



CASE-POCLAIN DISTRIBUTORS
CASE-POCLAIN LIMITED
OSBORN WAY, HOOK, NEAR
BASINGSTOKE, HAMPSHIRE RG27 9EX
TEL: HOOK (025 672) 3211/3161

BOLTON, LANCASHIRE	0204-791122
BRADFORD, WEST YORKSHIRE	0274-687788
AVONMOUTH, BRISTOL	0272-825 781
BRIDGEND, GLAMORGAN	0656-3836
NEWTON ABBOTT, DEVON	0626-832081
HALESOWEN, WORCESTERSHIRE	021-550-6186

BOWEN CASE-POCLAIN	
JAMES BOWEN & SONS LTD.	
EDINBURGH	031-443-4188
GLASGOW	041-773-2231
MUIR OF ORD, ROSS-SHIRE	0463 870678
ABERDEEN	0224 43332

NORTHDOWN PLANT (SALES) LTD.	
DEAL, KENT	03045 61511
EDENBRIDGE, KENT	034286 408

OLCOPE COMPANY LTD.	
NORWICH, NORFOLK	0603-45303
GREAT DUNMOW, ESSEX	0371-2181
NEWARK, NOTTINGHAMSHIRE	0636-76666
SAXMUNDHAM, SUFFOLK	072878-546
BURY ST. EDMUNDS, SUFFOLK	0284-850-547
BEDFORD	0234-854017

RAJMECH LIMITED	
OSWESTRY	0691-659244

SERVICE ENGINES (NEWCASTLE) LTD.	
NEWCASTLE-UPON-TYNE	0632-682545
STOCKTON	0642-65199
DURHAM	0385-770951

SGB (CHANNEL ISLANDS) LTD.	
JERSEY	0534-75281
GUERNSEY	0481-23771

CASE DISTRIBUTORS

SAVILLE TRACTORS (BELFAST) LIMITED	
DUNMURRY, BELFAST	614211

SOLENT ENGINEERING (I.W.)	
NEWPORT, ISLE OF WIGHT	0983-522632

DENNIS BARNFIELD LTD.	
CARNFORTH, LANCASHIRE	0524 733422

UNI-LOADER DISTRIBUTORS

BARLOW HANDLING LIMITED	
GLASGOW	02367-25061
DUNDEE	0382-811523
ABERDEEN	0224-878959

CHANNON & ROWE MACHINERY SERVICES LTD.	
NEWTON ABBOTT, DEVON	0626-62901

PREMIER FORKTRUCK SERVICES	
DEWSBURY, WEST YORKSHIRE	0924 495745

TRENCH PLANT SALES	
UTTOXETER	08893 3731

Sub Dealers:	
DIRECT FORK LIFT LTD.	
WEST BROMWICH	021-525-3575
SERVATRUC LTD.	
NOTTINGHAM	0602 785504



Britain's No. 1 in 4-Wheel Drive gets even better.

Now tougher, stronger, bigger, easier.

- * More power on the MF2620 and MF2680.
- * Improved gear ratios for extra output.
- * Better instrument panel.
- * Electro-hydraulic controls for Speedshift & 4WD.
- * Unbeatable leasing offer.

WORLD'S No.1 TRACTOR MAKER.

MF
Massey Ferguson

WATSON PETROLEUM

BRINKWORTH, CHIPPENHAM, WILTS. SN15 5DN

Telephone: Brinkworth 345 (066 641)

Authorised



Distributors

SUPPLIERS OF FARM FUELS & LUBRICANTS

DEPOTS AT MILTON KEYNES, OXFORD, SWINDON,
WOKINGHAM, BRIDGWATER, DORCHESTER, ROMSEY,
NORTHAMPTON, BOVEY TRACEY, ATHERSTONE,
FALMOUTH

CMA Journal Committee

Prof. John S. Nix FBIM
School of Rural Economics and Related
Studies
Wye College
Wye
Nr. Ashford
Kent TN25 5AH
(Chairman)

Stephen Meyler Esq.
Orchard End
Johns Green
Sandwich
Kent

Bill Mitchell Esq.
MAFF, ADAS, Block 2
Government Buildings
Lawnswood
Leeds LS16 5PY

Doug Brown Esq.
Rhadyr House
Llanbadoc
Usk
Gwent NP5 1PY

CMA Education Committee

J. Mike Atkinson Esq., MBIM
Seale-Hayne Agricultural College
Newton Abbot
Devon TW12 6NQ
(Chairman)

Tony K. Giles Esq.
4 Earley Gate
Whiteknights Road
Reading
Berkshire RG6 2AR

Bob McD Graham Esq.
Stareton
Nr. Kenilworth
Warwickshire

Mike R. Hastings Esq.
Training Centre
National Agricultural Centre
Kenilworth
Warwickshire CV8 2LG

Andrew John Esq.
Conderton Chase
Conderton
Nr. Tewkesbury
Gloucestershire

Len Norman Esq.
Four Winds
Sparsholt
Nr. Winchester
Hampshire



CLAUDE FENTON (Plant Hire) LTD.

**FOR ALL YOUR
PLANT HIRE REQUIREMENTS**

**WE SPECIALISE IN
LAND CLEARANCE
EARTH MOVING & PLANT REPAIRS
Reading RG6 1071**

ROSE KILN LANE

— READING —

RG6 0HR

Ashtronic Agricultural Ltd.

**The Old Black Horse, East Dereham Road, Scarning,
East Dereham, Norfolk NG12 2PG
Telephone: (036 287) 413**

SPECIALIST ELECTRONICS FOR AGRICULTURE

Seedereye	for monitoring all types of grain and precision drills.
Shafteye	for monitoring all moving shafts. Available with auto — shutdown for grain dryers etc.
Ritehite	Automatic drop height control for sensitive crops in field or store.
Optimatic	The worlds first production Automatic forward speed control for combine harvesters.
Positrol	For remote control of depth or steering of either self propelled or tractor drawn implements.

The Centre of Management in Agriculture

The Centre of Management in Agriculture (CMA) through its activities and services, is actively helping those working in farm management to improve their knowledge and professional skills.

Established in 1965 as the Farm Management Association the Centre of Management growth and even survival are all affords can still be improved and be still more individuals involved with farm business management.

It is the objective of CMA to promote the raising of standards in, and the professional status of, farm business management by:-

- Demonstrating the importance of management practice to the farm business
- Supporting and providing education and training in farm management techniques.
- Providing a focal point for those who work in the farm management world
- Co-operating with other organisations in the farming industry
- Via the British Institute of Management organising contact with managers from other sectors of British Industry.

WHAT DOES CMA DO?

Skills and resources are guided into two key areas of activity within CMA—local branches and national services/activities.

Local Branches

Provide the opportunity for members to meet and gain appreciation of other members' farming problems and achievements.

The CMA branches run programmes of events which include evening meetings with nationally known speakers; farming conferences; illustrative farm walks; and educational courses and seminars. An important part of these activities is that members not only receive information on farm management practice, but also that such information goes hand-in-hand with practical

illustration and the personal experiences of individual members.

NATIONAL SERVICES AND ACTIVITIES PUBLICATIONS

Farm Management is the Journal of the Centre of Management in Agriculture. With specially prepared articles and illustrated case studies it brings before members the new developments, current thinking and successful achievements in farm management.

Farm Management is issued four times a year and, as a result of the standards set by the Journal Committee, builds up into a comprehensive and informed reference source on farm management practice.

CMA News also issued quarterly, is the CMA news sheet. Members' comments; branch reports; personalities; the local and national activities programme; all keep members in touch with their management organisation.

Management Development—Education and Training

One-day courses and conferences form the backbone of the Programme designed to meet the training needs of those involved in the farm management industry.

Conferences

Regional one-day conferences are held throughout the country, covering subjects of topical interest to the farming community.

The two-day National Farm Management Conference held in Harrogate during November is the highlight of the CMA Programme. Recognised as one of the major conferences of the farming year it is addressed by nationally known speakers, and attracts some 200 farmers, farm managers and others involved in the industry.

WOODSHAVINGS AND SAWDUST SUPPLIES

J. & A. SUTHERLAND & CO. LTD.

Head Office:- 15-19 West Bowling Green Street,
Leith, Edinburgh EH6 5PR. 031-553 3690/3722 Telex: 72673
Depots:- Broxburn, West Lothian. Tel: 0506-854834
Annan, Dumfriesshire. Tel: 04612-2007
South Shields. Tel: 0632-564137
Also at Hexham and Hull.

Deliveries throughout the U.K. mainland.

Delivered in bulk, plastic sacks or bales.

Contracts entered into, supplies available at all times.
All supplies insured against any form of contamination.

Prices on application to Head Office, Edinburgh.

Fifty years of experience in this trade.

Largest fleet of specialised containers.

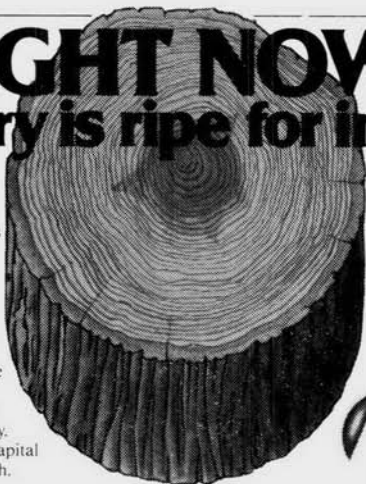
Supplies suitable for Poultry, Cattle and Horses.

J. & A. SUTHERLAND & CO. LTD.

RIGHT NOW... U.S. forestry is ripe for investment!

The experts agree, the statistics prove it! There's never been a better time to put money into North American timber. There, land prices are currently around EIGHT times lower than in the UK. Forests are vastly undervalued. Timber prices increase at an annual rate well above inflation.

The world constantly demands more timber and acute shortages are forecast. The best U.S. hardwoods have unique properties which make them valuable international currency. Investors are offered the choice of capital growth or a valuable income, or both.



Let Fountain Forestry channel your funds into this highly profitable area. With over 25 years experience in forestry management and investment, and a substantial interest in the U.S.A., we're equipped to give you expert advice, security and an excellent return. If you'd like to know more about this sound, attractive investment, please send now for the brochure.



**FOUNTAIN
FORESTRY**
Fountain Forestry Limited

Leave everything in our safe hands.

B. N. Howell,
Fountain Forestry Ltd.,
37 Queen Anne Street,
London W1M 9FB
Telephone: 01-631 0845
Telex: 295693

I am interested in
obtaining, without
obligation, a
free copy of
**Forestry Investment
in North America.**

Name _____

Address _____

Tel: _____

Telex: _____

Education

During 1982 the Education Committee reviewed its activities and needs of CMA members in the future. Members were consulted by questionnaire and a workshop was held at Reading University to help determine their requirements.

From these discussions came the conclusion that 4-5 day residential courses should play a less important role in a CMA programme due to the high costs involved and difficulty for members to leave businesses for that length of time. In their place should be a series of one-day courses on specific topics designed to meet identified needs and contribute to farm business profitability.

The programme of activities now agreed by the Committee is as follows:

- (a) An annual four-day residential course entitled "You and Your Management". This course will concentrate on how managers can increase their effectiveness—defining business objectives and the role the manager and his staff play in achieving their objectives. Massey Ferguson UK Limited are the generous sponsors of this course.
- (b) A series of one-day courses to be held within CMA branch areas throughout the UK. The titles offered for 1983 are:

LIVING WITH MANAGERIAL STRESS

Running your business or is your business running you? Dealing with people; organising your time; identifying priorities; keeping yourself informed. The seminar helps farm business managers minimise management stress and how best to live with it.

KEEPING FARM COSTS DOWN

Shrinking profits and less available cash are common problems in farming today. Borrowing levels are rising each year. What can be done. The course aims to help delegates examine the potential for containing costs in their businesses including strategies for purchasing; stock control; waste prevention; finance planning and cash flow control.

ENTERPRISE MANAGEMENT

Business profitability, competitiveness, growth and even survival are all vitally affected by the performance of individual managers at every level. Designed for the junior manager/unit manager the course concentrates on the supervisory and organisational skills required to complement technical know how.

MANAGING YOUR MACHINERY

Effective machinery management can be the key to successful financial and technical performance. From planning your farm machinery requirements through to capital investment appraisal the course provides a clear step by step approach to cost effective machinery management.

ON FARM MICRO-COMPUTERS

—Does your Business Need One.

The computer revolution has arrived in British farming. Pressure on farm business managers to purchase a computer system is increasing with the introduction of more reliable and sophisticated technology.

This workshop provides the manager with a clear and comprehensive appreciation of the nature and potential uses of the micro-computer. It cuts through the jargon and by presenting the potential benefits and disadvantages of computer systems, assists the manager to analyse his own business computer requirements.

Organised through the Centre and CMA local branches the courses will be held throughout the UK in 1983-84. Further details of these and other CMA courses can be obtained from: Tim Colston, Centre of Management in Agriculture, Management House, Cottingham Road, Corby, Northants. Tel: (05363) 4222.

This is by no means an exhaustive list and the Committee will endeavour to respond to any requests to run courses on other topics.

In addition to promoting courses the Committee has taken on board the work of pro-

ducing "Management Aids" a checklist type of document on such topics as "Taking a New Job", "Preparing a Curriculum Vitae", "Contracts of Employment" and "Disciplinary Rules and Procedures". These will periodically be issued to all members.

Your Committee feels this is a realistic programme which is flexible allowing CMA to

respond to the needs of members at low cost. We will be pleased to hear any views or suggestions members may have on this programme.

INFORMATION

Mike Atkinson

Education Committee Chairman



FOR PUMPS & TANKS

CONTACT



A. J. OLDER (CONTRACTORS) LTD.

Fuel Installation Engineers

Supply, Installation — Maintenance and Repairs of Commercial and Industrial Fluid Handling Equipment

Petrol & Diesel Installations

Overhaul and Repairs to all types of Industrial Pumping Equipment
New Tanks supplied to requirements and installed, etc.

Safari House, Haine Road, Ramsgate, Kent CT12 5AE.

Telephone: (0843) 89512

Report of Journal Committee

At the end of 1980 it was decided to increase the number of issues of the Journal from three to four a year. This at first created difficulties: more frequent meetings, a shorter time between issues (more restricting than might appear to those not involved in its production), more deadlines to meet, more articles to obtain of acceptable quality. However, the ship is now on an even keel and no real difficulties have occurred, on any of these counts, for some time.

Despite moves to jobs of ever-increasing levels of responsibility, our Editor, Doug Brown (now Principal of the Usk Agricultural College in Gwent), has taken all of this in his very capable stride.

Another decision made at the same time was to include advertising, but in such a way as not to detract from the appearance and quality of the Journal. Success in obtaining this advertising has been variable: it went well at first, through the efforts of Martin Evans, then it waned somewhat, but recently a record amount has been obtained — the work of Tim Colston. This has enabled the full direct costs of the Journal, including

printing and postage, to be covered, so that it is no longer a drain on BIM finances.

Increasingly articles are being submitted for inclusion in the Journal, as distinct from being requested. At its last meeting the Journal Committee had a record number of articles from which to choose; all of them were in fact of acceptable standard. This has given the Committee considerable satisfaction. But we are not complacent. We realise that it can still be improved and be still more interesting and useful to CMA members and other readers; (there are 275 subscribers, especially from libraries, throughout the world). The Committee is always delighted to receive articles or ideas for subjects and/or authors.

Two members recently left the Committee: Brian Camm and Peter Cockburn. Both have served the Committee well, the former for nearly ten years. We are grateful for all the work and effort they have put into the Journal. My gratitude, also, to the remaining members of the Committee must surely go without saying.

Prof. JOHN NIX
Chairman

FREE FARMING PLANNER

This handy, informative pocket-size booklet from Humber tells you all you need to know about organic based fertiliser.

Contents include: • Customer Reports • Application Rates
• Farming Diary • Results of University experiments
• Benefits • Ways in which we can help you.

Send for your FREE Farming Planner today.
No stamp Required.

Please send me my **FREE** Farming Planner.

I am a ☐ Farmer ☐ Manager ☐ Student

Name

Address

Tel:

Post to Humber Fertilisers plc, FREEPOST, Hull HU8 8DQ.



ELK *The tough contender* envoy



7 & 10 TON MANURE SPREADERS

- Equally adaptable to cope with slurry, poultry, manure and sludge lime
- Infinitely variable floor speeds with reverse facility



ELK Ltd.

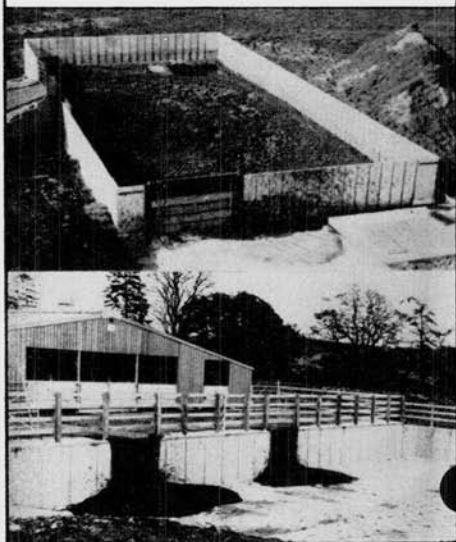
Elmhurst, Bedford Road,
Wootton, Beds MK43 9EJ

Tel: (0234) 767686

Semi-dry and Liquid Slurry Storage

ABOVE or BELOW GROUND

Semi-dry or liquid slurry storage. Belcon walls can be used in a wide range of farm storage applications. Talk to us about your problems or send for full details from



Bell & Webster Ltd

Gonerby Works, Great North Road, Grantham,
Lincs. NG13 8HQ. Tel: 2277.

An Eleco Holdings Company

The British Institute of Management

—what are the benefits of being part of a larger management institute?

All full CMA members are members of the British Institute of Management, and their subscriptions to this professional body are eligible for tax relief. In addition to the benefits they derive from the Centre of Management in Agriculture, they have access to a wide range of general management resources which they may make use of from time to time. For those wishing to pursue a career in management these resources can be of great value, and include:

Management Information Centre

A team of trained information staff able to answer questions on a wide range of management topics. They are backed by a library of over 70,000 books, journals, reports and company documents, which includes a specific section on farm management. Most of the library material is available on postal loan.

Management education information

The Management Information Centre also provides information and advice about a wide range of courses on management and

related subjects, including their selection, content and effectiveness.

Careers Information Service

For information on careers, career changes and strategies for finding appropriate employment.

Employee relations and personnel management

Advisory staff are available to help with all aspects of employee relations and personnel management; the interpretation of employment legislation, contracts of employment, redundancy, unfair dismissal and industrial relations.

Executive Remuneration Service

Provides advice to management about current trends in salaries and fringe benefits and the techniques of effective salary administration.

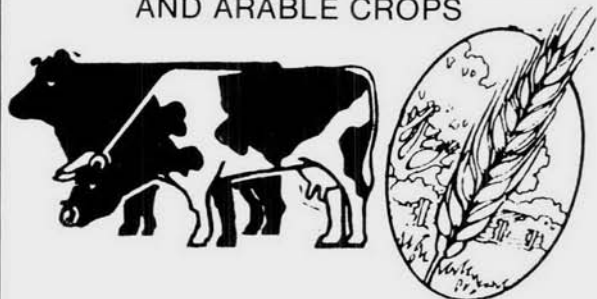
Publications

All corporate members receive *Management Today* a monthly magazine with articles and news about management in general, and *Management Review and Digest* the quarterly journal of BIM and its activities.



WF Fertilizers Ltd.
St. Columb 880666

WE SPECIALISE IN ALL TYPES
OF FERTILIZERS FOR GRASSLAND
AND ARABLE CROPS



**WF DISTRIBUTORS THROUGHOUT
SOUTH WEST ENGLAND**



We offer a fast and efficient service in the supply and delivery of all types of steelwork at competitive rates.

We specialise in steel framed buildings for agriculture, but will be pleased to quote for all your steelwork requirements.

To discuss your individual requirements, no matter how small, phone

David Barrington on Kingsland (056 881) 288
Longmoor, Kingsland, Leominster, Herefordshire HR6 9RG

CMA Branches and Honorary Officers

Chairman

BERKSHIRE

P. I. Cockburn
Churn House, Churn Estates Ltd.,
Whelevbury, Didcot, Oxon.
Tel: (0235) 850312

CAMBRIDGE

P. L. Stroude
Home Farm,
Langstanton, Cambridgeshire
Tel: (0954) 80008

CHESHIRE

T. Tedstone
Raby House Farm,
Willaston, Wirral, Cheshire
Tel: 051-327 4594

DEVON FMA

T. M. Rousefell
8 Alexandra Close,
Credon, Devon EX17 2DY

DORSET

G. A. Hann
Manor Farm,
Maiden Newton, Dorchester, Dorset
Tel: (0300) 20587

DURHAM

S. Heddle
Hollymoor Farm,
Cockfield, Durham
Tel: (0388) 87260

GLOUCESTERSHIRE

HAMPSHIRE

E. W. Cox
Cortington Grange, Corton,
Warminster, Wiltshire
Tel: (0985) 50483

HEREFORDSHIRE

D. Wareham
Brierley Court, Brierley,
Leominster, Hereford HR6 0NU
Tel: (0568) 2580

Secretary

I. Buchanan
Dept. of Agricultural Economics
University of Reading, Reading, Berkshire
Tel: (0734) 875123 ext. 6279

W. A. King
Farm Manager, Ciba Geigy Agro-Chemicals,
Whittlesford, Cambridgeshire CD2 4QT
Tel: (0223) 833621 ext. 4660

J. J. Wilson
Vice-Principal, Cheshire College of
Agricultural Research, Reaseheath,
Nantwich, Cheshire
Tel: (0270) 625131

J. A. Hawkins
Bicton College of Agriculture,
East Budleigh, Budleigh Salterton, Devon
Tel: (0395) 68353

W. N. Lawton
Dorset College of Agriculture
Kingston Maurward, Dorchester, Dorset
Tel: (0305) 64738

I. S. Johnson
Durham Agricultural College,
Houghall, Durham DM1 3SG
Tel: (0385) 61351

A. C. Jefferey
52 Church Drive,
Quedgeley, Gloucester
Tel: (0452) 720852

T. J. Firmston
Hampshire College of Agriculture,
Sparsholt, Winchester, Hampshire
Tel: (096 272) 441

B. S. Bullen
Little Vern,
Marden, Hereford
Tel: (056 884) 540

KENT

M. J. Taylor
Home Farm, Crete Road,
Hawkinge, Folkestone, Kent

LANCASHIRE

D. Ishmael
Cuthbert Scotts Farm, Walthew Lane,
Kitt Green, Wigan WN5 0LA

LINCS. HOLLAND

D. I. Garner
Kookaburra,
Sutton Bridge, Spalding, Lincolnshire
Tel: (0406) 350465

EAST MIDLANDS

B. Tipper
9 Berry Close
Great Bowden, Market Harborough,
Leicestershire
Tel: (0858) 66766

NORFOLK

N. Steed
West Barsham Estate Office
Fakenham, Norfolk
Tel: (0328) 2470

WEST SCOTLAND

J. Forster
Mains of Larg
New Luce, Newton Stewart

SURREY

N. W. Mouton
Stable Flat, Loseley Park,
Guildford, Surrey

WEST SUSSEX

M. Monkhouse
King and Chasemore, Estate Office,
Station Road, Pulborough, West Sussex
Tel: (079 82) 2081

STAFFORD FMA

D. Blundy
Dunston Dairy Farm
Dunston, Stafford
Tel: (0785) 712880

NORTH LINCOLNSHIRE/EAST RIDING

D. Jordan
Tranby Croft
Tranby Hall, Anlaby, Hull
Tel: (0482) 657937

NORTH YORKSHIRE

J. Loveday

G. Champion
c/o Beer Cart Lane,
Canterbury, Kent
Tel: (0227) 57741

J. L. Morgan
Fenton Farm, Eagland Hill,
Pilling, Preston, Lancashire
Tel: (039 130) 429
Tel: D. Welton (0772) 744123

G. McMichael
Agricultural Education Centre,
Park Road, Holbeach, Spalding, Lincolnshire
Tel: (0406) 22007

J. R. Sumner
Farm Management Advisory Officer,
Chalfont Drive, Nottingham
Tel: (0602) 291191

G. H. Reynolds
Norfolk School of Agriculture,
Easton, Norwich, Norfolk NR9 5DX
Tel: (0603) 742105

D. Douglas
West of Scotland Agriculture College,
Farm Planning Unit, Auchincruive, Ayr
Tel: (0483) 6288
J. Davis
ADAS, Block B, Epsom Road,
Guildford, Surrey
Tel: (0423) 62881

C. Stewart
Midland Bank plc,
13 Friary Street, Guildford, Surrey
Tel: (0483) 64896

J. Coates
c/o Staffs College of Agriculture,
Rodbaston, Penkridge, Staffordshire
Tel: (0785) 712209

J. Moverley
Bishop Burton Agricultural College,
Leconfield, North Humberside
Tel: (0401) 50481

P. Green
Askham Bryan Agricultural College,
Askham Bryan, York
Tel: (0904) 702121

New force in fertilizers

Of the 2.36 million tonnes of plant food used by U.K. Agriculture each year, 60 per cent is nitrogen and only 19 per cent is phosphate (P_2O_5). Whereas nitrogen consumption by U.K. farmers has been increasing by around 5 per cent a year since 1977/78, the demand for P_2O_5 has only risen at half this rate.

The world fertilizer industry can be roughly divided into two — the companies for which nitrogen or ammonia are the backbone, and those which produce mainly phosphate and/or compound fertilizers. Obviously, the market growth in the U.K. has favoured the former.

Last year, the acquisition of Fisons agricultural fertilizer business by the Norwegian energy and fertilizer group, Norsk Hydro a.s., brought together two companies from each background. And so a new force in the U.K. fertilizer industry was created — NORSK HYDRO FERTILIZERS LIMITED.

This has brought a major change in the structure of domestic fertilizer manufacturing and marketing, and one which guarantees the U.K. farmer with a continuing choice of products and services.

First

Whereas the Fison family had built their business around phosphate fertilizers — starting as long ago as 1847 — Norsk Hydro was the first to manufacture nitrogen fertilizers in 1905, using hydro-electricity as an energy base.

Today, the Norsk Hydro group is the largest fertilizer manufacturing group in Europe. It is amongst the largest producers of ammonia in the world and, with a total fertilizer production capacity of 7.5 million tonnes/year, they are also one of the world's top three fertilizer manufacturers.

Although fertilizers are the largest industrial activity of Norsk Hydro, it is primarily an energy company. And its investment in —

and access to — oil and gas brings power and security to its fertilizer operation. This is because ammonia production requires a stable and economic supply of energy.

The group is part-owner of the Ekofisk oil and gas field and has a major share in the Frigg gas field — both major finds in the North Sea. In addition, Norsk Hydro has stakes in 49 exploration blocks on the continental shelf and has been a partner in around 200 North Sea oil and gas wells.

Committed

But Norsk Hydro is committed to fertilizers as its prime industrial activity. And it is this commitment, plus a secure raw material base and a proven ability to invest in the U.K., that brings a new power into the domestic fertilizer scene.

Since the acquisition, the U.K. business has changed its trading style from 'Fisons Fertilizers' to **Norsk Hydro Fertilizers** — British based, British managed, and British manned. Production, distribution and administration have been rationalized and the operation has been geared towards meeting market requirements — the needs of customers are viewed as paramount.

Initiatives

Although the basic and familiar product range has been retained, the past year has seen new compound analyses introduced — as well as new packaging initiatives and a substantial development of the company's computerized agronomic services for farmers.

New products have been introduced for the vast acreage of grassland which receives regular dressings of slurry (Cut and Graze — No K 29:5:0), for winter cereals on clay soils (Heavy Land Wheat 6:30:0) and for application after silage on high phosphate soils (NK Silage 24:0:15).

The emphasis is on meeting product requirements on a **local** basis, and a substantial

programme of field trials — on major crops and grassland — has been established on as many as 16 Regional Demonstration Centres. These are located on commercial farms, covering the main soil and crop types. Results from the trials are published for local farmers — who are also invited to inspect the trials during the growing season — and the data is used to 'fine-tune' product analyses and local recommendations.

Investment

New initiatives have been taken in packaging, with significant investment in the development of Big Bags — following an extensive pilot scheme which embraced production, transport and on-farm handling trials.

A new Big Bag packaging unit has been installed at the company's largest production unit at Immingham, South Humberside, to meet the increasing demand for compounds and straight nitrogen in these labour-saving containers.

The Norsk Hydro Fertilizers Big Bag is of square-shaped design for stability in handling and stacking. The seams of the outer polypropylene case are double-stitched for strength and the specially designed lifting loop is stressed to 5 times the loaded weight — to provide a safety factor of 5 to 1. An inner plastic liner protects the fertilizer — to give free flowing granules at drilling time.

On-farm handling studies have shown that the Norsk Hydro Fertilizers Big Bag can cut fertilizer handling and loading times by around two-thirds, compared with 50 kg bags on pallets. This results in higher work rates and lower costs — and because all the humping is removed from the job, the workers like them!

Activity

One area of intensive activity during the past twelve months has been the further development of the Norsk Hydro Agronomic Services for farmers — many of them computerized, and all designed to provide greater efficiency in key areas of farm management.

These include the long established Milk-Plan dairy herd management service, which monitors the herd's physical and financial



performance; and the comprehensive soil analysis service for determination of major and minor nutrients — as well as pH and reserve potash.

Back-up

Norsk Hydro Fertilizers are out to supply products with full technical back-up to ensure their most efficient use, so that their customer gains the maximum benefit from his fertilizer investment. Two agronomic services specifically related to fertilizer handling and application are the Norsk Hydro Handling Consultancy and their Distributor Testing Service.

The computerized Handling Consultancy provides the farmer with an analysis of his current system of fertilizer application and handling — including man-hours per tonne, work-rates per day and costs — and compares this with an alternative system of the farmer's choice.

The Distributor Testing Service provides the Norsk Hydro Fertilizers customer with a check on the accuracy of his fertilizer application — by any type of distributor — and is carried out on the farm by trained staff using specialized equipment.

Unique

Norsk Hydro Fertilizers staff are convinced that their range of agronomic services add tangible benefits to their product and ser-



The new force in fertilizers



**Norsk Hydro
Fertilizers**

Levington Research Station
Levington
Ipswich
Suffolk
IP10 0LU
Telephone: 0473 76911

vice package — but the jewel in their 'services' crown is their unique Irrigation Service.

This service provides prompt, accurate advice on irrigation scheduling — how much water, and **when** to apply it. It is based on scientific investigations carried out over many years to establish the many factors which influence the use of water by plants — all built in to a sophisticated computer programme.

By helping the farmer make best use of an

expensive resource, it not only helps to reduce costs but also to increase yields. Potatoes irrigated to the schedule provided by the service have given yields over 6 tonnes/acre more than those watered on a partial or 'ad hoc' basis — enough to pay the fertilizer costs several times over!

The new company — Norsk Hydro Fertilizers — is obviously setting its stall not just as a provider of quality products, but also of the back-up agronomic services which can help the farmer to gain the utmost from his investment in fertilizers.

CONCRETE SYSTEMS LIMITED

Gortgonis, Coalisland, Co. Tyrone

FOR

SLATS

Singles up to 12ft
Treble Grids up
to 12' 6"

(CATTLE AND LOAD BEARING)

ALSO . . . PIG and CALF SLATS, SUPPORT BEAMS,
PASSAGE SLABS, COW BEDS & CUBICLES,
FEEDER SECTIONS, DRINKER TROUGHS, ETC.

All Manufactured to BS 5502

Contact our Sales Office for prices, leaflets, information, etc.

Coalisland (08687) 40326 or 48113 or 40868 after hours

QUALITY PRODUCTS AT KEEN PRICES

Control systems for parasitic gastro-enteritis in cattle

Roundworms are probably the single most important cause of economic loss in beef production. This despite the fact that more money is spent by the farmer on attempted treatment and prevention than is spent on any other disease condition. A survey published in the **Veterinary Record** showed that, despite all the effort put into promoting the correct use of cattle wormers, many of the doses given were wasted because of an incorrect understanding of the epidemiology of the disease. There is a long tradition that cattle are wormed when it is convenient for the farmer to handle the cattle rather than at the time when it will do the cattle most good.

Most of the intestinal worms have rather similar life cycles, so for the purpose of this article, *Ostertagia* will be taken as typical of the group.

Lungworm infections constitute a separate problem and cannot be dealt with in an article of this length.

Stomach and Intestinal Worms

By far the most important stomach worm of cattle in the United Kingdom is *Ostertagia ostertagi*. There are several other species but as they all have rather similar life cycles and can be controlled by the same treatment programme, a description of a suitable method for the control of *Ostertagiasis* will also cover the control of the other species.

Roundworms have a life cycle which is partly free living on pasture and partly parasitic within the host. When an infective larva is picked up with the grass during grazing, it moves into the stomach lining, develops and then returns to the stomach cavity where it is mature in about 3 weeks and starts to lay eggs. The eggs pass out in the dung, hatch to a free living stage, which after a period of development and growth moults into a 3rd stage infective larvae, and the cycle is ready to start all over again.

Like all animals, reproduction is part of the process for continuation of the species, but in addition, there has to be a means for the population to survive from year to year or the species would die out. *Ostertagia* has two ways of doing this. Firstly, the third stage larvae is quite tough and is capable of surviving on pasture over winter. In the natural environment cattle would calve in the Spring. Thus overwinter survival would mean that some eggs put out by calves in the Summer and Autumn would still be on the pasture as third stage larvae to infect a new generation of calves the next year. By putting young stock out onto pasture which had carried young cattle the previous Autumn, we are copying the natural cycle. We are however doing it at stocking rates massively higher than would have occurred prior to domestication and it is not surprising that the balance of nature is disturbed and disease occurs.

Ostertagia has another survival mechanism however. Some of the larvae picked up in the late Autumn do not complete their life cycle immediately. They enter the stomach wall and then go into a state of arrested development. Development starts again usually about March and the larvae then emerge and complete their life cycle. Thus under natural conditions, they would be putting out eggs in time to meet the new calf crop. Again the problem arises because of intensification. The number of larvae picked up in the Autumn can be enormous. As many as 250,000 inhibited larvae in one stomach lining is not uncommon. When these all emerge at the same time, the damage to the stomach wall is massive. Violent diarrhoea follows and this can result in collapse and death. This syndrome is usually referred to as Type II *Ostertagia* to distinguish it from the normal form of *Ostertagia* which occurs when the animals are at pasture.

The Occurrence of Ostertagia Larvae on Pastures

When a pasture has carried cattle the previous year as has been already stated, some larvae will survive over Winter. These larvae gradually die off if they do not find a new host, and so the level of pasture contamination gradually declines until by the end of June, they are virtually gone. If during this period, young stock are placed on the pasture, then they pick up larvae which develop to adults and lay eggs. From the end of July these eggs give rise to a sharp increase in the number of larvae on the pasture (the 'mid-summer rise') and from August onwards, this heavy pasture contamination is likely to give rise to disease. Occasionally, the burden of overwintered larvae may be so heavy that signs of disease can occur shortly after turnout.

Control of Ostertagiasis

The purpose of any treatment regime is to break the worm's life cycle. The point to be made is that worming of young stock before their first turnout to grass is a total waste of time and money since the animals have no worms and treatment before turnout will have no effect on the worms they will pick up from the pasture.

Thereafter there are several possible control systems.

(i) Clean Grazing

If it is possible to turn calves out onto a new ley or onto land which did not carry cattle the previous year, no worming will be required.

If further stock are added to the group later in the season, and these have been grazing elsewhere, they must be wormed with an effective wormer and kept yarded for eight hours prior to adding them to the group. It is also of vital importance, if this system is not to be subject to breakdowns, that in the event of the cattle being moved later in the season, they are moved to aftermaths or other land which has not been grazed by cattle during the current season.

Though a very effective system, it has never gained very wide acceptance because of the problems of ensuring adequate supplies of

wormfree pasture under our variable climatic conditions. Another problem is that with exposure to worms, cattle tend to develop a degree of resistance to infestation. Cattle which have not been exposed in their first grazing season would seem to have less resistance during the second season than stock which has received an exposure. Thus unless management is particularly skilful or the stock are all going for slaughter prior to a second season at grass, the problems may not be prevented but only deferred.

(ii) The Dose And Move System

This usually involves a dose at 3-4 weeks after turnout which has two benefits: it reduces the chances of disease in the Spring as a result of picking up heavy burdens of overwintered larvae and may somewhat reduce the 'mid-summer' rise of larvae on the pasture.

A second dose of wormer is then given at the end of July and the animals after being held in yards for a few hours are moved onto aftermath. It is important that they are not returned to the original pasture before moving to aftermath, or they will contaminate the new pasture. The original pasture is now heavily contaminated and is not suitable for young stock for the rest of the year.

The disadvantage of the system occurs as soon as stocking rates are near levels required for optimal grassland usage. As pasture quality declines during the Summer and the animals are getting larger, so the acreage they require increases. By the Autumn, the land from which the stock were removed in July has grown a new crop of grass. The temptation to utilise this often proves to be great, with the obvious result!

(iii) Concentrated Spring Dosing

The key to this system is that overwintered larvae will die out by the end of June. If these larvae can be prevented from laying eggs then the 'mid-summer' rise will not occur. The pasture will thus not be dangerous in the Autumn and although it is unlikely to be worm-free, overwintered larvae will be relatively few in numbers the next year. The system thus becomes even more effective when used over a period of two or three years.

NEW AVAILABLE IN
5 LITRE
PAC

THE BEST THING IN WORMING SINCE PANACUR.

PANACUR+ SELENIUM & COBALT

Lack of the essential minerals Selenium and Cobalt in the pasture is known to be a problem on many farms. Now there is a simple way to provide these elements - Panacur SC.

Inadequate Selenium and Cobalt intakes can lead to poor growth rates, poor fleeces and lowered fertility. Lambs also require these trace elements and their diet can be supplemented with Panacur SC for as little as a penny per lamb dose.

Panacur is effective against all major roundworms, lungworms and tapeworms in one low volume dose.



Panacur SC

SELENIUM AND COBALT ADDED TO THE PROVEN WORMER

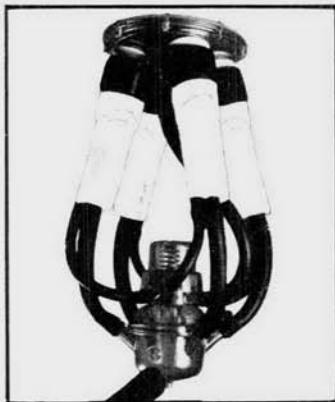
Animal Health Division, Hoechst UK Limited, Walton Manor, Walton, Milton Keynes, Bucks, MK7 7AU

Active ingredient: Fenbendazole 2.5% suspension with 0.4mg Selenium and 0.94mg Cobalt per ml (P.L. 86/4130). **Uses:** Broad spectrum anthelmintic for the control of nematodes affecting the gastro-intestinal and respiratory tracts of sheep.
Dosage and Administration: 5mg/kg body weight. For oral administration. **Market outlet:** P.M.L. **Precautions and warnings:** etc. Animals must not be slaughtered for human consumption until 14 days after last treatment. Milk from treated animals may be taken for human consumption 72 hours after last treatment. **Storage:** at room temperature. **Presentation:** 2 litre pack.
Further information available on request.

Hoechst 

® registered trade mark

Time for change with Bodmin Nu Pulse the New Zealand Milking System



HERE ARE THE FACTS WHY YOU SHOULD INSTALL THIS PROVEN UNIQUE MILKING SYSTEM.

- * helps prevent mastitis
Nu Pulse balanced vacuum results in far less incidence of fall-off and cup crawling, both associated with mastitis
- * reduced shell volume and large bowl
M.O.C. requires less vacuum capacity to maintain reserve, large bowl eliminates flooding and impacting
- * lower maintenance costs
only few moving parts, easier and less costly to install and maintain
- * automatic pulsator
Nu Pulse automatically balances the vacuum on both sides of the liner and adjusts pulsator speed to the cow's flow rate.

TWO YEAR WARRANTY ON
PULSATOR/CLAW PARTS
CONVERSION TO ANY MILKING PLANT
'MAIL TODAY'

NU PULSE (EUROPE), Regal Lodge, Gazeley Road,
Kentford, Newmarket CB8 7QB. Tel: Newmarket 751615

Name

Occupation

Address

County Code

Tel. No.

The idea is to dose at short intervals until the end of June. Various recommendations exist, either 3, 6 and 9 weeks after turnout, or 3, 7 and 11. In the North of England and in Scotland where turnout is later, if the second dose takes you up to the end of June — say on a mid-May turnout, then the third dose may be omitted.

This system has the advantage of great flexibility. Firstly it permits the use of set-stocking which may be particularly useful to dairy farmers who have additional constraints on their grassland usage. Secondly it enables animals that have been moved to aftermilking to be brought back to the original pasture at the convenience of the farmer. Like clean grazing systems, any animals being added to the group must be wormed first. Finally it does not interfere with the development of natural immunity. In a trial, the susceptibility to infection during the second season at grass was shown to be no greater than with animals that had been left untreated throughout the grazing season.

(i) The Housing Dose

It is generally recommended that cattle should be dosed at housing whatever the system. Although the incidence of clinical type II Ostertagiasis is relatively low when it occurs it is often fatal and surviving animals are almost always poor do-ers.

Fenbendazole (Panacur) introduced in 1976 and most of the anthelmintics introduced since are effective against the inhibited Ostertagia larvae. A dose given at housing will prevent type II Ostertagiasis by killing these larvae before they have a chance to emerge from the stomach wall and do the damage.

On trial carried out in Southern Ireland clearly showed that even in the absence of clinical type II, the emergence of smaller numbers of Ostertagia not only affected performance in the latter part of the housing period, but that this even had a 'knock-on' effect on performance in the subsequent grazing season.

The opinion of the author therefore is that the housing dose is a good insurance policy.

Agriculture futures markets

by C. H. Prior-Willeard

There are sectors within European Agriculture which despite any alleviations from membership of the Common Market, encounter radically unstable conditions and uncertain returns. Efforts to counteract the effects on Agricultural Industries have led to the formation of some highly sophisticated and complex market support measures, all aimed to ensure an adequate living standard to the farmer. However, those do not halt the market forces which gave rise to the volatility of market prices nor, by the same token, do they alter or mitigate the resultant fluctuations.

In this article, a market mechanism for coping with price movements without involving huge cash inputs from central Government or indeed taxpayers, is discussed; these are the Agricultural Futures Markets.

The first Futures Market in Great Britain to open its doors for trading in an agricultural commodity was the London Grain Market. This was established in 1929 under the auspices of the London Corn Trade Association, to cope with the risky business of importing a large proportion of the nation's grain needs from overseas.

The grain importers and merchants, in committing their businesses to long term contractual commitments over grain supply, found that subsequent fluctuations in the price of grain could turn a comfortable profit into a damaging loss. The same financial risks applied to stored grain. Insurance could be found to underwrite the risks of loss through fire, flood, however, no company would offer cover against the effects of a drop in the market price of that stored grain.

The origins of futures go even further back to the American Civil War. Merchants of different commodities began to give pledges for delivery some time hence, which had firstly a financial value and secondly could

be bought and sold themselves. The system was developed into the present Futures Contract, which as any Commodity Broker will point out, is a promise to make delivery at a given time in the future, of a stipulated quantity of a particular commodity, the quality of which is specified.

Clearly this is an unusual form in which to carry out trading business but the major advantages that it has, is extreme flexibility. A futures contract can be bought and sold quickly on a futures market. The price at which the trade takes place is determined with equal speed and is then reported extensively, becoming part of an independent reference price within the trade.

To see the practical significance of Agricultural Futures it is best to consider the operations of existing markets. The Grain and Feed Trade Association (GAFTA), runs or provides administrative facilities for the three current agricultural futures markets in London; The London Grain Futures Market; The Soyabean Meal and The Potato Futures Markets. It is also behind the development of the fourth, The Meat Futures Market. Each are as diverse as the industries they serve.

The Grain Futures Market is still located at its original venue in The Baltic Exchange where it began trading in 1929. With the exception of the Second World War, Grain Futures have been traded ever since. Currently, two contracts are traded; EEC Wheat and Barley.

It is important that although a futures market is essentially a "paper market" principally for traders to offset their price risks, physical delivery in fulfilment of the contractual promise should occur occasionally. This ensures that the close link between the futures and the physical market is retained. On the Grain Futures Market, deliveries occur far more often than is usual on a futures market since nearly 10 per cent of all the contracts traded

proceed to delivery to one of 160 designated Futures Stores. As such, this is the highest delivery futures market in the world.

One of the facilities of futures which contributes most to the flexibility of operation and enables the risk offsetting or "hedging" function to operate, is what is termed "closing out". Since physical quantities of the commodity are not actually changing hands in the market, a sale of futures contracts can be effectively cancelled by a subsequent purchase of a similar number of contracts. After the settling of any financial disparities a trader's commitment to the market has totally ceased. This means that a futures market can be used by people who can achieve desired ends without having to be concerned with physical problems of quality and supply.

The main function of the Grain Futures Market and indeed any other, is the process of hedging. Like the often used adage "to hedge ones bets" meaning to safeguard an opinion, hedging, using a futures market is to protect oneself against price movement. Given the availability of a paper market linked to the physical market in price—they fluctuate in a similar manner — physical traders found that they could arrange their affairs using futures so that circumstances leading to a loss in profits through a bad price movement, could give rise to a compensating profit on the futures market. A Seller, committed to supply ahead, is vulnerable to a subsequent fall in price. By selling futures the very drop in price which would give rise to a loss, does, by buying back (closing out) at a lower level, yield a profit.

In the Grain Market arable farmers sell forward to their merchants who hedge the attendant risks on the futures market. Conversely, a livestock farmer, using barley to feed his beef herd, pig unit or poultry flock, can use Grain Futures to secure a known input price for his business. He can do this up to twelve months ahead since the Grain Futures have price quotations published for six delivery months on a rolling rotation. When one delivery or "spot" month has passed, the month for the next year starts being traded.

Traders using futures need not worry about the financial capability of the other party to pay; he surely will. This is achieved through the Market Clearing House, the financial referee of the market. Through a system of deposits and careful monitoring of Clients accounts and commitments in futures, the Clearing House ensures the integrity of the market.

The Grain Futures Market is unique in this country by having its own Clearing House. This, like the market, is owned and operated by GAFTA. The majority of the other Futures Markets in London are serviced by the International Commodities Clearing House owned by six major banks — having a capital of £15 million.

The performance of the Grain Market is at the present curbed by the generous level of intervention price support. Clearly where grain merchants can take advantage of high support prices underpinning the market price, they have no need for price insurance however inexpensive.

The Potato Market on the other hand, has what is termed, a light EEC support regime, and the market is subject to extreme volatility. In one year the price for maincrop potatoes barely covers the cost of production, whereas the next, through inclement growing conditions, the market price may be in the multiple hundreds, with the consequent effect on subsequent demand.

The London Potato Futures Market was set up in 1980 by GAFTA and the National Federation of Fruit and Potato Trades, to give all sectors the opportunity of introducing some stability into their forward transactions and management techniques. A futures market does, in time, exert a stabilising influence on the prevailing market price by reducing the extent of peaks and troughs in fluctuation.

The contract is denominated in maincrop potatoes conforming to the Potato Marketing Board Ware Standard and lists thirteen varieties acceptable to the Market. All details of the running and working of Agricultural Futures Markets, Potatoes in particular, are

FARMING FINANCE

A comprehensive range of finance,
equipment and vehicle leasing facilities available.

For full details and quotations
contact your local Chartered Trust office.

REGIONAL OFFICES AND DIVISIONAL OFFICES

North East: Chartered House,
8 Blenheim Terrace, Leeds. LS2 9JA
Tel: 0532-458488

North West: Six Acre House,
17 Town Square, Sale, Cheshire.
M33 1XZ
Tel: 061-969-1221

Wales and South Wales:
Caerwys House,
Windsor Lane, Cardiff. CF1 3SQ
Tel: 0222 484484

Midlands: Honeywell House,
Orphanage Road, Erdington,
Birmingham. B24 9HL
Tel: 021-373-8227

Southern: First House,
Park Street, Guildford, Surrey. GU1 4XQ
Tel: 0483-503111

London: 131 South Street,
Romford, Essex. RM1 1PJ
Tel: 0708-25331

Scotland: 24 Newton Place,
Charing Cross, Glasgow. G3 7PY
Tel: 041-332-1800 & 4793

Nottingham: 95 Upper Parliament St,
Nottingham. NG1 6LT
Tel: 0602-49661

Sheffield: 24 Cumberland Street,
Sheffield, South Yorkshire. S1 4PT
Tel: 0742 760431-5

Coventry: Dunsmore House,
Oxford Road, Ryton-on-Dunsmore,
Coventry. CV8 3EH.
Tel: 0203 302262 & 301311

Bournemouth: Clifton House,
10 Poole Hill, Bournemouth. BH2 5PS.
Tel: 0202 28911

High Wycombe: 27-28 Octagon Parade,
High Wycombe, Bucks. HP11 2HZ
Tel: 0494 446511-5

Southampton: 134-135 High Street,
Southampton. Hants. SO9 1GD
Tel: 0703 27872-7

Southend: 200-202 London Road,
Southend-on-Sea, Essex. SS1 1PJ
Tel: 0702 330031-5

Stratford: 128 The Grove,
Stratford, London. E15 1NS
Tel: 01-519 7331-5

Norwich: Castle House,
21 Davey Place, Norwich. NR2 1PW
Tel: 0603 615013-5

Jersey: Osprey House,
5-6 Old Street, St. Helier, Jersey. C.I.
Tel: 0634 71880



Chartered Trust plc

A member of
Standard Chartered Bank Group

Head Office: 24-26 Newport Road, Cardiff. CF2 1SR. Telephone: 0222 484484.

monitored by their Committees of Management. These of necessity are made up by Broking Companies on the market, but in addition key members of the trade are represented and their input is crucial to the successful decision making of the Committee.

In much the same way, the Soyabean Meal Futures Market was established by GAFTA in 1975 in response to the prevailing volatile market conditions following the prohibition of export of protein seeds by the United States of America. Shippers and Compounders found a domestic hedging mechanism for their imports of meal, or once again, the ability to finance any stocks of meal, invaluable. Many of the well known animal feed manufacturers have been active participants in the market.

The Soyabean Meal Futures Market differs from the other purely agricultural markets in that it has more international relevance. The listed delivery points for the market include Liverpool, Rotterdam, Ghent, Antwerp and Hamburg. Participants of the market, maybe traders in Chicago interested in the relationship between the London Market and their own on the Chicago Board of Trade, Brazilian shippers or merchants may use the London Futures price for several months ahead to decide whether to export their supply or to store it in the expectation of higher prices. Should they do the latter, by taking a hedging position, they are able to lock-in a price for their Soyabean Meal which will pay for storage, shipping and still return a satisfactory profit.

Using a Futures Market to hedge insulates a trader against adverse price fluctuations but also windfall profits. For example, a potato farmer in February will survey his fields before planting his maincrop seed. He knows the costs of growing the crop, but the final price paid to him by his local merchant will either return a meagre profit if the growing season is good, or a handsome profit in a poor season. Who can tell in February?

A price of £120 per tonne would give a comfortable return. By contacting his Broker, the farmer can sell a number of futures contracts for November delivery at £120 per tonne. This price would now be guaranteed. Clearly, where the season yields an abund-

ant supply the market price would not reach the farmers desired figure. The futures price, having dropped in sympathy with the market price will yield a compensatory profit roughly in line with the shortfall.

Where, however, the market price in November has risen above £120 to £160 in the wake of a poor season, the futures hedge will yield a loss, again roughly equivalent to the amount that the physical price at the time of lifting is below the original price which results in the desired price being achieved.

The desirability of relying on windfall profit rather than the realisation of a predetermined price planned several months ahead must be a decision for the business management involved. The increase in sensible use of Futures Markets over the last few years does point to the latter being preferred.

Futures trading is not confined to storable, harvested commodities in the Agricultural sphere. GAFTA is currently providing the means for a Meat Futures Market to be formed. Although two of the popular carcase meats enjoy underpinning from the C.A.P., there are some areas where market support is not obvious.

Pigmeat has a "light" market support within the Common Market and as such, has to compete in the market place with highly subsidised beef and lamb. At the input end, the price of grain is notoriously volatile (it has its own futures market), which results in the "muck or money" adage often applied to pig production.

Pigmeat will be the first contract to be traded, with beef and perhaps imported lamb in the future. The development of new futures markets will not stop there, as the use and knowledge of futures grows throughout the agricultural industry, more areas prone to uncertainties will wish the option of use of a Futures Market in their own sectors. Contracts have been loosely proposed for Apples and Eggs.

As the cost of supporting agriculture in Europe becomes higher and the marketing systems become more sophisticated, alternative ways in which the same objective can be achieved will be examined, Futures Markets are just one.

Pressure cleaners on the farm

by Terry Joslin

For the farmer, innovative machinery means little unless it can be clearly demonstrated that it is both cost-effective and an improvement on anything else he has in his 'armoury'. The new-generation steam/pressure cleaning machines fall clearly into this category in that they transform modest amounts of water into working tools of quite awesome power and performance. At very high pressures, water can be considered semi-solid; this means that stubborn deposits or fouling can be quickly 'cut' and rinsed away.

The versatility of pressure-cleaners is surprising. They may be used to clean both building fabric and farm machinery far more effectively and speedily than any traditional method. Drains can be both unblocked and cleaned, ice melted quickly away, or parasites washed gently off the hides of cattle. Even pipe-runs can be cleaned using circulation methods.

Pressure washers for agricultural use fall within the 300 — 2,200 psi (20-150 bar) range using 2-4 g.p.m. although certain applications such as land drainage clearance require considerably more power. Modern experience, particularly in the U.S.A. and on the Continent, indicates clearly the need for very hot water or steam, yet it is a curious fact that the majority of pressure washers sold to agriculture in the U.K. are of the small, cold-water type. This either reflects the farming community's reticence or the manufacturers' inability to market effectively. Either way it can be clearly demonstrated that small capacity cold-water machines are not totally adequate for the serious task of ridding the farm of disease or for the effective deep-cleaning of machinery in planned preventive maintenance programmes.

The present generation of machines will provide the user with variable temperatures (up to 150°C) and variable pressures (30-2,200 psi) as well as detergent selection facilities giving a range of percentage mixtures either before or after the pumping stage. This is

important because the delivery of a very hot detergent mix at pressure greatly increases cleaning power. Reduced surface-tension of hot water and enhanced detergency are important factors contributing to cleaning power, as any housewife with a washing-machine knows. Very aggressive chemicals can also be safely metered and delivered at low pressures without having to go through the pump.

Machine choice is complex; there are over 200 models to choose from at present on the U.K. market, many of them of Continental origin and incorporating progressive features. They fall broadly within the following categories:-

- a) 110 volt, single phase, electric,
- b) 240 volt, single phase, electric,
- c) 415 volt, three phase, electric,
- d) petrol or diesel primary power,
- e) power take-off.

Selection is determined by factors relating to power requirements, variability of performance, mobility and cost. For example, a three-phase electric machine gives excellent power and variability, but is limited on mobility and is fairly expensive. A 10 H.P. trailer-mounted diesel unit gives excellent power and mobility but is limited in variability and is very expensive. An average choice would be a single-phase (240 v.) electric machine of 1200 psi and 150°C with a full range of metering facilities.

Whatever power or mobility range is chosen, important criteria in final selection are:-

- a) availability at short-notice of spares and service. A prolonged breakdown is both expensive and irritating,
- b) variability of performance. A fixed pressure and temperature machine is limited in the tasks it can perform,
- c) quality of materials used in construction and attention to design detail. Plus-points are the extensive use of stainless steel components, stout plastics, easy to remove nozzles and lances. Fragility of components is to be avoided,
- d) extension facilities available. Some mak-

ers offer a range of nozzles or lances ranging from a high-power cutting jet of 0°, up to an 80° fan for gentle washing-down. Foam-generation, large capacity suction pumps, powered rotary brushes, sandblasting kits are some of the options available.

Some manufacturers are now providing specialised additions to very high-powered jetting units. One example is a pulsator device designed to extend the length of underground drainage pipework that may be jetted from some 3-400' to well over 1,000' at a time.

One of the principal functions of an effective pressure-wash system is to deliver detergents and disinfectants at optimum levels. These chemicals are constantly being updated and improved, and many manufacturers now design their products with pressure-washing in mind. The consensus view is that for the effective removal of livestock fouling prior to disinfecting, an alkaline-based detergent (as opposed to a neutral detergent) is essential in order to break down the products of soiling, e.g. blood, fats, protein, etc In some products, biocides built into the detergent will simultaneously kill a wide range of bacteria, fungi and algae. The better products will, at the same time, be highly surfactant (i.e. will reduce the surface tension of water) and will prove highly penetrative of the surface being cleaned. Hard deposits are broken down by the sheer 'wetting' ability of the detergent. Reputable manufacturers also submit their products to the Veterinary Investigation Centre for testing and approval, and only these products should be used in the cleaning and disinfecting of dairy, pig and poultry buildings. Of course, they will also be fully biodegradable and, therefore, acceptable to the authorities responsible for effluent waste disposal.

Farm machinery should always be cleaned by pressure-washing methods. Again, specifically designed solvents and detergents are available which can reduce down-time dramatically, often from days to hours. Morale is improved for service mechanics and repair times are reduced when machinery is in a clean condition. Examples abound where machinery is put away hurriedly and uncleared at the end of the season. Concrete-hard mud, impacted grease and foreign matter combine to cause subse-

quent seizures, breakages, over-heating and fires.

The point is stressed that where machinery is concerned, time and effort spent in cleaning and servicing on a planned preventive maintenance basis saves money. Machinery life can be considerably extended enabling capital costs to be discounted over longer periods and so giving reduced annual costs.

The coming-together of water and electricity, to which must be added chemicals of various strengths on both sides of the pH scale, scalding temperatures and pressures in excess of 2,000 psi plus the exposure to violent disease potential, combine to present an obviously dangerous working situation. It is important to understand the hazards and take sensible precautions to avoid accidents, within the spirit of the Health and Safety at Work legislation.

A Jetting Code, in the form of a large poster display is available for the pressure-cleaning industry but is equally valuable to all farmers operating their own machines. It covers:—

- Responsibility of employers and employee.
- Care and maintenance of equipment.
- Protective clothing and personal protection.
- Permanent cleaning areas.
- Frost precautions.
- Accidents.

Complete breathing protection is nowadays available in the form of battery-powered filter hoods or masks which are fully approved by the Health and Safety Executive for use in the nuclear, chemical, agricultural, industrial and medical fields. Research at Harwell and Porton Down guarantees full bacteriological and viral protection.

Finally and briefly, there are no regulations regarding electrical power supplies to pressure-cleaners in agriculture. It is critical, therefore, to avoid taking power from within the spray-area being cleaned and that an earth-leakage trip device is used to protect the operator in the event of short-circuiting. In conclusion, pressure-cleaning techniques have much to offer the farm manager in terms of animal hygiene and preventive maintenance. It is a prudent manager who takes out insurance to minimise the effects of minor disasters. It is a very wise one who takes steps to prevent them in the first place!

HYDROBLAST of **DIDCOT**

STEAM AND PRESSURE CLEANING SERVICES
TO INDUSTRY AND AGRICULTURE

FOR EXPERT CLEANING OF PLANT, BUILDINGS,
DRAINAGE SYSTEMS AND MACHINERY

50 The Broadway, Didcot, Oxon
Didcot (0235) 815586

IF YOU NEED

A HIGH-PRESSURE WASHER
OR AN AIR COMPRESSOR
OR A PUMP FOR ANY APPLICATION
OR A REPAIR FOR THE ABOVE

CONTACT:

INVERESK ENGINEERING

15 MILL HILL, MUSSELBURGH, MIDLOTHIAN
Telephone: 031-665 8683 (24 hours)



Agricultural Technical Aids Ltd.,
Milestone, Bwlchgwyn, Nr. Wrexham,
Clwyd, Wales. Tel: (0978) 758150.

A must for Dairy Farmers, Stock breeding, Save by having an instant mastitis check.

If your milk is clean, you receive a bonus.
The cows you buy are free from mastitis.
You isolate infected cows to stop the disease spreading.
You know if the antibiotics are controlling infection.
You know when to call the Vet.
You keep clinical mastitis out of your tank.
You will not have to throw good milk away.

Dairy products - Free from mastitis. Abnormality Testing Aid.

A Ministry of Agriculture spokesman said
"One of the most exciting breakthroughs ever
in the field of analytical science."



MAKE MORE OUT OF MILKING WITH MANUS



This year aim to realise your profit potential with Manus behind you. With a long and successful track record in the dairy industry, Manus demands quality equipment with quality performance - so you can choose it with confidence.

For more details about Manus dairy equipment, contact your Manus dealer or Manus (Great Britain) Ltd.

Quality equipment to help your milking routine.

- Full range of Herringbone and Abreast Parlours.
- Jars or large bore.
- ATOP Vacuum Operated Automatic take off - no electricity needed.
- Manufeed Out of Parlour feeding for the large herd.
- Management Programmes, Cow Calendars, Dual Feed option.
- Automatic Milk Yield Recording.
- Range of Chore Time Flex Auger bulk bins.
- Up to 4 different lines from each bin.

MANUS

makes for better milking

Manus (Great Britain) Ltd.,
London Road,
Moreton-in-the-Marsh,
Glos GL56 0JH. Tel: 0608 50836/7

Dairy Management— milk hygiene

Supplied by Agricultural Technical Aids Ltd.

Of all the causes of abnormal milk in dairy cows, 'mastitis' infection of the udder is unquestionably the most important. Mastitis results in lowered yield; chemically abnormal milk results in poor quality milk products which are substantially inferior and can be very dangerous because of a large number of pathogens in the milk. The disease has been recognised for 100 years.

Infected milk is low in lactose, phosphate, calcium, potassium and fat but high in chloride, sodium and albumin and this has a damaging effect on all milk products and health.

Veterinary surgeons have helped to reduce the incidence of the disease although sometimes the incautious use of antibiotics by the farmer has introduced other problems for both animals and humans.

The new test for the hygienic quality of milk, which was introduced in October 1982, is the total bacterial count (TBC) which measures the number of bacteria present in the milk as it leaves the farm. The result is expressed as the total bacterial count per millilitre (ml) of milk. In order to reduce the possibility of defects developing in milk before processing and in milk products produced subsequently, it is essential to produce good quality milk with a low total bacterial count when it leaves the farm.

Sources of bacterial contamination

The bacterial count of milk produced from healthy cows under good hygienic conditions will seldom exceed 10,000/ml. Counts in excess of this indicate that one or more of the sources of contamination is not being adequately controlled.

There are three main sources of contamination:

Inside the udder—mainly mastitis;

Outside the udder—soiling of teats;
Milking equipment — poor cleaning and disinfection.

Inside the udder

Milk from a healthy udder is unlikely to contain more than 1,000 bacteria/ml but infection with mastitis producing organisms can be responsible for very high counts. Milk from a sub-clinically infected quarter may have a count of up to 10,000/ml while that from a clinically infected quarter may even be as high as 100,000,000/ml. The addition of 1 litre of mastitic milk from such a clinically infected quarter to 1,000 litres of bulk milk may increase the count of the bulk up to 100,000/ml. It is, therefore, essential to identify cows with clinical mastitis at the earliest possible opportunity in order to prevent mastitic milk from entering the bulk tank.

The most effective way of doing this is to take and examine the foremilk of each cow at each milking using a foremilk cup. An in-line mastitis detector is a useful additional aid to foremilk testing. However, it has limitations when used alone, because with pipeline milking and possibly with recorder jar systems fitted with automatic milk transfer, mastitic milk will have passed into the tank before the mastitis has been detected.

MILK FROM ANY COW WITH CLINICAL MASTITIS MUST BE WITHHELD FROM THE BULK TANK.

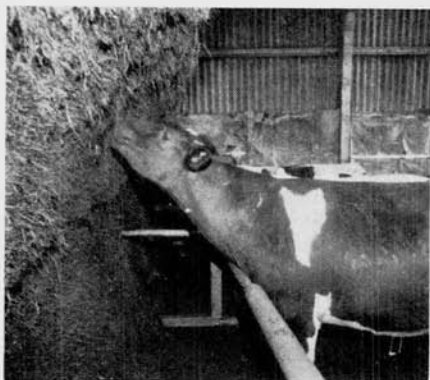
Reducing the incidence of mastitis in a herd will help you to reduce the bacterial count and a control routine should include:

Provision of clean, dry and comfortable housing;

Maintenance of an efficient milking machine;

Identification and treatment of clinical cases as advised by a veterinary surgeon;

Keeping a record of all clinical cases and



ARE YOU SELF FEEDING SILAGE
THIS WINTER OR THINKING OF
DOING SO?

WHY NOT TRY THE SILOBAR.

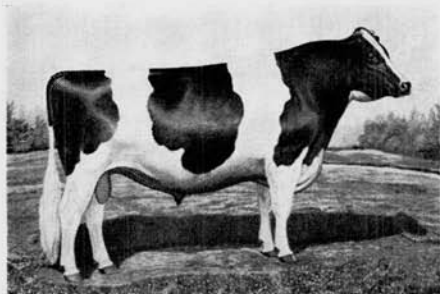
Simplicity, strength and safety
were the mother of this invention.

With these qualities in mind the
SILOBAR persuaded the eminent
judges at the 1982 Stoneleigh
Dairy event to make it an award
winner. The Silobar can be
considered for grant aid under
AHGS investment grants.

ATKINSON BROS.

74 Silkin Way, Newton Aycliffe, Co. Durham DL5 4HB

Telephone: (0325) 486904



BRITISH HOLSTEINS

are

THE BREED WITH THE
GENETIC POTENTIAL TO
COVER RISING COSTS.

WE ARE THE
INDEPENDENT BRITISH
A.I. ORGANISATION

WITH THE HOLSTEIN BULLS, PROGENY TESTED
THROUGH A.I., ALL PLUS PROVEN, ALL M.A.F.F.
APPROVED.

P.H.B. Ltd., Wesley House, Buckley, Chester CH7 2EL

PLEASE WRITE OR PHONE FOR BROCHURE

(0244) 542139

(08242) 3642

treatment to enable chronically affected cows to be culled;
Disinfection of teats of all in-milk cows after each milking;
Use of dry cowtherapy on all cows.

Outside the udder

Failure to wash and dry teats thoroughly before milking may increase both the bacterial count and the amount of sediment in milk. Filtering the milk removes the larger particles of sediment. IT DOES NOT REMOVE VERY SMALL PARTICLES OR BACTERIA. Because of the large number of bacteria even on clean, dry litter, the apparently clean teats of housed cows can contribute a high number of bacteria, if teats are not washed and dried.

The contribution from the teats of visually clean cows during the grazing period is much less, but even so, it is better to wash and dry teats of all cows regularly, rather than risk contamination of the milk from unwashed teats.

Teats should always be dried after washing because of the heavy contamination which

can occur from water left on the teats.

Methods of teat washing and drying

In milking parlours use hoses providing a supply of warm water containing a disinfectant (e.g. hypochlorite, iodophor, chlorhexidine) and dry with individual paper towels.

In cowsheds, use buckets of warm water containing a disinfectant (as for parlours) and either cloths (one for each cow) or preferably individual paper towels. Where cloths are used, they should be washed after each milking and stored in a disinfectant solution or if there are not many, they can be boiled.

To minimise the time spent on teat washing and drying, cows should be kept as clean as possible by:

- Providing well designed cubicles, yards or cowsheds;
- Using ample litter as frequently as necessary to maintain clean, dry beds;
- Removing slurry from concrete areas at least twice a day;
- Trimming cows' tails;

HOLD IT

WITH GRANO EFFICIENT SILAGE STORAGE

SLURRY KING
The durable maintenance free freestanding answer to slurry storage and separation.

COUNTERFORT
Freestanding for silage or bulk storage. Designed so that you can seal the vertical joint. (Compression bolt provided)

TWINSLATS AND QUADSLATS
Cattle or tractor loading available in a variety of lengths.

GRANO

To: Grano Limited, Stoney Stanton, Leicester LE9 6LX.
Tel: (045 527) 2457 (L/F1)

Please send me brochure illustrating Grano Concrete Structural Panels.
Name.....
Address.....
Tel.....

Providing and maintaining concrete or well constructed hardcore tracks;
Maintaining clean areas in gateways and around drinking troughs.

Milking equipment

Poorly cleaned equipment is very often a cause of high bacteria counts. It is essential to have a well designed, installed and maintained milking plant and to consistently use an effective cleaning system. The milking machine should be designed and installed so that there are:

A maximum of six milking units per cleaning circuit, unless large bore or double transfer lines are fitted.

The minimum number of joints.

Smooth milk contact surfaces.

Swept bends in the direction of milk flow.

There are some important jobs which need to be carried out on all milking machines irrespective of the cleaning system. These include:

Brushing the outsides of all clusters and jettors (where applicable) in hand hot detergent-disinfectant solution at the end of each milking.

Washing the air pipeline and interceptor (container near the vacuum pump to trap liquid) at least once a week or more often if necessary.

Replacing worn or perished liners, rubber tubes and joints.

Descaling as necessary.

With both circulation and acidified boiling water (ABW) cleaning regular observations should be made to see that all units are receiving sufficient cleaning solution. Checks should be made to ensure that:

The quantity of hot water is correct. Use 10-14 litres/unit for circulation cleaning and 14-18 litres/unit for ABW.

The temperature of the water as it enters the plant is correct. For circulation, follow the recommendation of the manufacturer of the detergent-disinfectant or, in the absence of a recommendation, heat the water to 85°C. For ABW a temperature of not less than 96°C should be used.

The quantity of the approved cleaning chemical(s) is correct. This will be indicated by the manufacturer on the product label(s).

The bulk tank must be cleaned after each milk collection. Regular visual checks should be made of the overall cleanliness and in particular of areas difficult to clean, such as the outlet, the outlet plug or valve, the agitator, the thermometer stem and the underside of the bridge.

Milk cooling

Cooling of the milk to 4.5°C which is a contractual requirement, will reduce bacterial multiplication during storage on the farm. Some bacteria (psychrotrophs) can grow slowly at low temperatures, but good hygiene will reduce their number in milk so that the bacterial count is not adversely affected during storage on the farm. COOLING CANNOT ELIMINATE THE EFFECTS OF POOR HYGIENE.

Pasteurisation

Pasteurisation of milk kills most of the bacteria which can constitute a danger to public health, but some types (thermodurics) will survive and may cause faults in both pasteurised milk and products made from it. Although pasteurisation will kill psychrotrophic bacteria, these organisms can produce heat resistant enzymes which survive pasteurisation and, again, can cause problems in dairy products. PASTEURISATION CANNOT ELIMINATE THE EFFECTS OF POOR HYGIENE.

Healthy, clean cows, good milking methods and clean equipment will produce milk of low bacterial count.

Gun Care

by Mike Barnes
Editor, Sporting Gun

The proper cleaning of a gun can not only extend its lifetime and improve its appearance but also help ensure its reliability and safety.

There's only one thing worse than having a gun malfunction when the only covey of the drive flies in your direction, and that is having a gun go off of its own accord.

Guns can be as dangerous as they are delightful and proper care is the only way that you can derive maximum pleasure from your shooting.

There are many who boast that they seldom bother to clean their gun, or that it might not look much but they seldom miss anything with it. Such claims are quite stupid.

It takes little time to clean the barrels and knock any dust or bits of dirt off the action at the end of a day.

And at the end of the season it is obviously worth your while taking your gun to the local gunsmith for a thorough clean and check-over, or to give it a bit of extra attention yourself.

For those who plan on undertaking a more thorough overhaul the following may be of some help:

Cleaning the barrels: Using a phosphor bronze brush attached to the cleaning rod, clean the inside of the barrels. Prior to starting, it does help if a detergent oil is used to dissolve the powder residues left from the shot.

Use a cleaning patch with the applied solvent and after having scrubbed the barrels with the brush, another cleaning patch should be pushed through the barrels. The final operation is to apply a light film of oil either with a wool mop or an aerosol.

The extractors (ejectors) and extractor bed are a trap for water and dirt. To remove them is a simple operation. Select a screwdriver (you can buy a special set from your local gunsmith, who might refer to them as turn-screws) with a blade that has a nice fit in the slot of the extractor pin. Unscrew the pin and the extractors are simply lifted out.

Wipe both extractors clean and then proceed to wipe the extractor bed, which may best be achieved by placing a piece of cloth on a narrow file.

The best method of cleaning the extractor hole is to use a feather, particularly if the extractor has a small leg. It would be impossible to perform this part of the operation with a piece of cloth.

Having made sure that all is clean, apply a light film of vaseline or oil and replace them. Finally replace the extractor pin, not forgetting to clean the hole first.

This is obviously a job that doesn't need doing on a regular basis, but it won't do any harm to check the extractors if the gun has been used in heavy rain.

The final task on cleaning the barrels is to give some attention to the outside, particularly the ribs where dirt and water has a nasty habit of collecting. Having made sure they are clean, wipe over with an oiled rag.

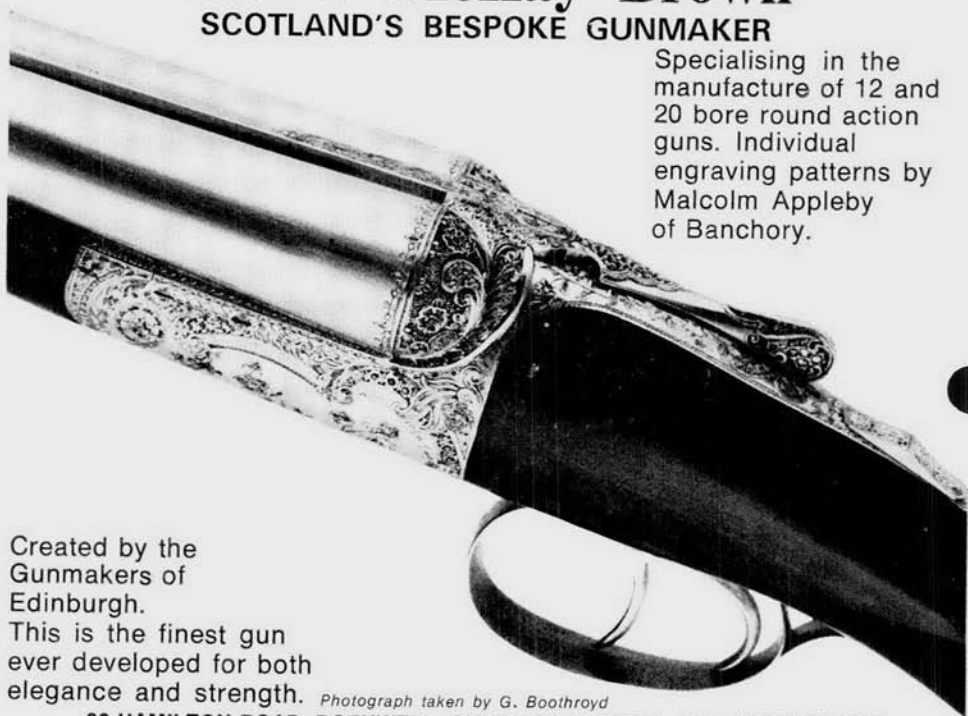
A very important point to remember is that blood and salt water are the prime causes of rusting on barrels — if either touch the metal, try and clean immediately to avoid the possibility of rust and the loss of barrel bluing.

The action: Obviously this is a little more difficult to clean than other parts of the gun and many shooters believe that the more oil they put into the slots and holes the more it

David McKay Brown

SCOTLAND'S BESPOKE GUNMAKER

Specialising in the manufacture of 12 and 20 bore round action guns. Individual engraving patterns by Malcolm Appleby of Banchory.



Created by the Gunmakers of Edinburgh.

This is the finest gun ever developed for both elegance and strength.

Photograph taken by G. Boothroyd

32 HAMILTON ROAD, BOTHWELL, GLASGOW G71 8NA Tel.: (0698) 853727
 $\frac{1}{3}$ mile off M74 at Junction 5



MANUFACTURERS OF SPORTING, BLANK AND SPECIAL PURPOSE CARTRIDGES, TO THE GUN TRADE, AGRICULTURAL MERCHANTS AND GAME DEALERS ETC.

Raker

Unit 2, Josselin Court,
Burnt Mills Industrial Estate,
Basildon, Essex, SS13 1QE

Tel: Basildon (0268) 727689

will prevent rusting and corrosion and so ensure that it stays in good working order.

This is not so. Excessive oil attracts dirt and grit, and after a while congeals — the combination is a common cause of gun malfunction. Similarly the stock and fore-end will absorb oil until it can absorb no more — rather like a sponge — and in time the wood will rot.

Wipe the areas you can see with a light film of oil — this will include triggers, trigger guard, top lever safety thumbpiece, the action body, including locks, flats and face.

To clean those places which are inaccessible with a cloth — such as striker holes, slots and cams on the fore-end — once again you should look to a feather to do the job. First clean using a new feather then apply a little oil and repeat the operation.

The woodwork: Your gun stock will have been given one of the many different types of finishes that are on the market. Among the most popular are French (button polish) or the conventional oil finished stock that has been polished by hand. This method of treating the woodwork takes many hours, not only in preparation but also to achieve a high standard of finish that not only enhances the figure but also affords protection to the wood.

After a day's shooting in the rain many shooting men apply a coat of linseed oil to their stock. This really isn't necessary — simply make sure that it is dry.

In the case of the oil finished stock, simply rub the stock with the palm of your hand. This will tend to bring back its life and beauty.

Stocks that have been given one of the many other types of finish, simply wipe over with a dry clean cloth as linseed oil will not penetrate a gloss finish.

The checkering is cleaned with the aid of a nail brush, but not the plastic type. Gently brush backwards and forwards.

Storage: Having completed the cleaning of the gun, we now have to consider where to store it. Many problems occur as a result of guns being stored in wet or damp cases, damp rooms etc.

If storing until the following day, make sure that before laying it away into its case, that the case is free of any moisture. This particularly applies to the gun slip, which can be a real harbour for damp.

If the gun is being cased for long periods of time, also ensure that you inspect it on a regular basis. It is not sufficient to lift the lid of the case and look in — lift the gun out of its case and thoroughly inspect it. Also check the case — better safe than sorry.

Gun security: The other possible way of storing your guns is, of course, in a locked cabinet. A number of firms are now producing these cabinets from the basic metal box design to elaborate, walnut cabinets that would enhance any room.

Apart from the important factor of ensuring that your gun does not get stolen, keeping a gun in such a cabinet is just about the best possible method of storage.

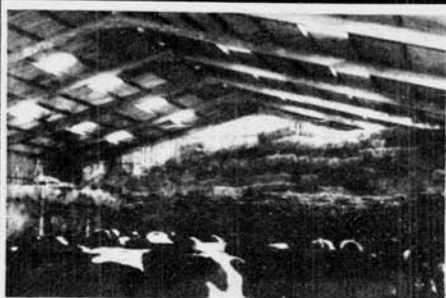
Conclusion: Always remember to be sparing with the oil. Too much will inevitably harm your gun, and if you check it regularly it is unlikely to ever let you down.

But . . . inevitably some water may penetrate into the working parts of your gun and can, if left over a long period of time, cause many problems and possibly result in costly repairs.

Bearing this in mind it is wise to have your gun completely stripped and cleaned every two years. This is not a particularly costly job and during the cleaning, if taken to a competent gunsmith, it will be examined for signs of wear and tear.

A minor adjustment or small repair can often save embarrassment, even the loss of a day's shooting . . . and ultimately spare you the agony of perhaps a very big bill.

SILAGE BARNS and HAY BARNS FOR THE COST CONSCIOUS FARMER



Tick your interest:

CUBICLE HOUSING	HAY BARNS
STEEL FRAME BUILDINGS	SILAGE BARNS
GRAIN/POTATO STORAGE	LOOSE BOXES
BUILDINGS	SHEEP HOUSING
COW KENNELS	PIGGERIES
DUTCH BARNS (Lean-to	REARING HOUSES
and steel buildings)	

Consult us with your particular needs

Let us quote you for any of your
FARM BUILDINGS NOW!



FOUR LANE ENDS,
WEM, SALOP
TEL. 0939 32382

You won't regret it

BY
COMPLETING
COUPON
IN BLOCK
CAPITALS

NAME.....
ADDRESS.....
.....
.....

DE VILLE & LEAR

WE HAVE 30 YEARS
OF EXPERIENCE AT
YOUR DISPOSAL AND
FOR QUALITY AND
SERVICE YOU CANNOT
DO BETTER.

WE CAN UNDERTAKE
COMPLETE ERECTION
OR:—

YOU CAN SAVE MONEY

AND HAVE YOUR
BUILDING IN KIT FORM
TO ERECT YOURSELF.

PERSONAL ATTENTION
AND A KEEN PRICE
EITHER WAY.

MILL LANE WORKS,
ROSTON, ASHBOURNE,
DERBYSHIRE

Telephone:
Ellastone (033524) 302

Farm buildings: grain drying and storage

by I. J. Loynes, BSc

Information Officer, Farm Buildings Information Centre*

The first question anyone considering investment in grain storage facilities might ask is — "Why store grain?". The simple answer is that having been harvested, the grain will have to be stored for a period of time as the needs of the intended market dictate, be this on or off the farm of origin. Therefore, storage facilities of some kind are essential to help maintain the quality of the harvested grain for the intended market and possibly to improve the quality slightly by the use of drying and cleaning facilities which can be attached to or associated with the store.

Having discovered that grain storage is an essential process in the grain industry as a whole, the second question any producer considering investment in storage facilities may ask is "Do I need a grain store?". Unfortunately, the answer to this question is not so simple as there are many factors and options to be weighed up and considered before a final decision can be made.

Broadly the grower has three choices:-

- a) Sell the grain at harvest, thereby needing no storage facility;
- b) Rent or buy space in a local co-operative store, or
- c) Invest in storage facilities on the farm.

The above options seem fairly straightforward, but the final decision can only be arrived at after also considering the influence the intended market will put on the store design and facilities, as well as the overall cost, the convenience or ease of handling, the choice of an appropriate site, any planning or building constraints on the farm, and the volume of and the number of types of grain to be stored.

For example: consider the grain crop is solely intended for home consumption, as

animal feed. It will obviously be convenient to have the storage facilities close at hand so option a) above can be discounted. As animal feed grain requires no sophisticated storage facility and as a simple bin system can be purchased for as little, or less than it might cost to rent or buy space in a co-operative store, option b) can be discounted, and therefore, option c) is chosen on the grounds of convenience, intended use and cost. (Assuming no planning constraints to be in force and services and site readily available).

THE PROPERTIES OF GRAIN

Before considering the various systems of grain storage currently available, let us first discuss the physiological properties of the grain itself which ultimately affect the ways in which we treat the grain in order to achieve successful storage.

Each kernel of grain is biologically active, consisting of a living embryo and food store encapsulated in a number of firm protective layers. Grain continues to respire during storage producing as waste, heat and moisture.

Heat produced by respiration can lead to the development of hot spots in the grain mass. The higher the moisture content and the temperature of the grain on delivery to the store, the greater risk of hot spots and hence the deterioration of the grain.

Ideal storage conditions are therefore those which reduce this metabolic activity to such a low level that the grain mass is sufficiently stable to survive with minimal deterioration.

*Farm Buildings Information Centre, NAC, Stoneleigh, Kenilworth, Warwickshire

PERRY'S PORTABLES

SHEDS, SHEDS AND MORE SHEDS

FARMERS—IF YOU REQUIRE SHEDS FOR STABLES,
CHICKEN HOUSES OR ANY OUTDOOR USE THEN
CONTACT THE SPECIALISTS.

We open **Six** days a week, 8am—8pm.

★ **CABINS AND FENCING ALSO SUPPLIED** ★

If you don't see what you want, tell us and we make it.

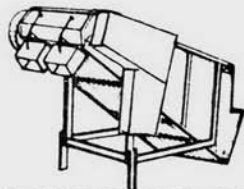
Any size made to order. Price includes delivery and
erection.

BILLERICAY 52036

PERRY'S PORTABLES

Oaklands Farm, Goatsmoore Lane, Billericay, Essex

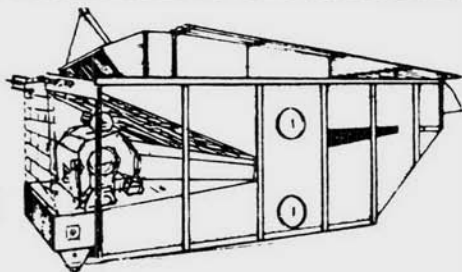
Alvan Blanch



MILLING AND MIXING



BY APPOINTMENT
TO H.M. QUEEN ELIZABETH II
SUPPLIERS OF GRAIN DRIERS



**DRIERS - New Energy Savers
AND GRAIN HANDLING**

CULTIVATORS, HARROWS



& SEED BOXES

FREE TECHNICAL ADVICE AND DRAWING OFFICE FACILITIES

Chelworth, Malmesbury, Wiltshire, SN16 9SG, England

Telephone: CRUDWELL (06667) 333/9 (7 lines)

Telex: ALVAN BG 44304

In addition to these factors, stored grain is or can be at risk from fungal activity, insects, loss of germination and from mite infestation. Whilst it is usual for grain moisture content to be uppermost in the mind when thinking of storing grain, it is apparent that these other factors may influence the success or failure of long term storage.

The conditions for the safe storage of grain are set out in Figure 1

From Figure 1 it is obvious that to store grain successfully, with a minimum of loss from any cause, it should be kept below about 12% moisture content and no higher than 16°C. However, as mites can be controlled with good store management, and because 12% moisture content is often considered too dry, the recommended storage moisture content is 15%, which is also a more realistic target for relatively simple stores to achieve.

THE PROPERTIES OF AIR

As already mentioned, the drying of grain to a suitably low moisture content is by far the most common method of preservation in use on farms today. All these methods rely on air of a suitable quality, in ambient condition (low temperature drying) or heated (high temperature drying) being passed through the grain to remove the grain moisture. The most important property of air in relation to grain drying is its relative humidity.

The amount of moisture which a volume of air can absorb is determined by the air's relative humidity. Air which is not saturated, i.e. has a relative humidity of less than 100%, can absorb moisture and thus exert a useful drying effect on the grain being ventilated. This drying effect will be realised until equilibrium is reached (Table 1); con-

Equilibrium grain								
moisture content %		12		13		14		
		15	16	17	18	19	20	
Air relative								
humidity %		50		57		65		
		72	77	82	86	87	88	

Table 1. Equilibrium values of grain moisture content and air relative humidity.



Fig. 1: Safe storage conditions

versely when the air being passed through the grain is too humid the grain will take up moisture from that air. Therefore, it is essential to be able to measure both the grain moisture content and the air's relative humidity for successful storage.

The table indicates that the safe storage moisture content of grain (15%) can be achieved by drying the grain with air of about 70% relative humidity. Fortunately, in August and September the relative humidity of air is below this level for considerable periods when effective drying can be achieved.

RATE OF DRYING

The rate of drying depends on the air temperature, relative humidity and on the rate at which it is forced through the grain. Storage drying (Low temperature drying) is a slow process beginning in the lower layers of moist grain progressing towards the top of the heap. The top layers remain moist until the drying front reaches the surface and this limits the maximum depth for storage drying to about 3m, if economical air flow rates are to be used. As an example an air flow rate of 0.05m³/s/tonne will result in a drying rate of about 1% per 24 hours. If 5% moisture content is to be removed the top layers will not be dry for at least 10 days.

By raising the temperature of the air its drying capacity can be greatly increased. It can



East Riding Sack & Paper Co.

The Airfield Full Sutton York YO4 1HS

Tel. 07596 388 9 Telex 57989

Manufacturers of Quality

Paper Sacks **for** **Seed Corn**

INSULATION

RIGID POLYURETHANE LAMINATED PANELS
SELECTED SECONDS FROM LARGEST MANUFACTURER

TEL. BENTHAM (0468) 61227

GLOSSOP (045 74) 66382

HYDE (061 368) 6155 24 HRS

RON PENNOR AND SONS

HIGHER TATHAM, NR. LANCASTER

SPRAY FOAM INSULATION

Write or phone for competitive quotation

E.L.F. (URETHANE) LTD.

**292 Whalley Road, Clayton-le-Moors,
Nr. Accrington, Lancs.**

Tel: Accrington 37066 Anytime

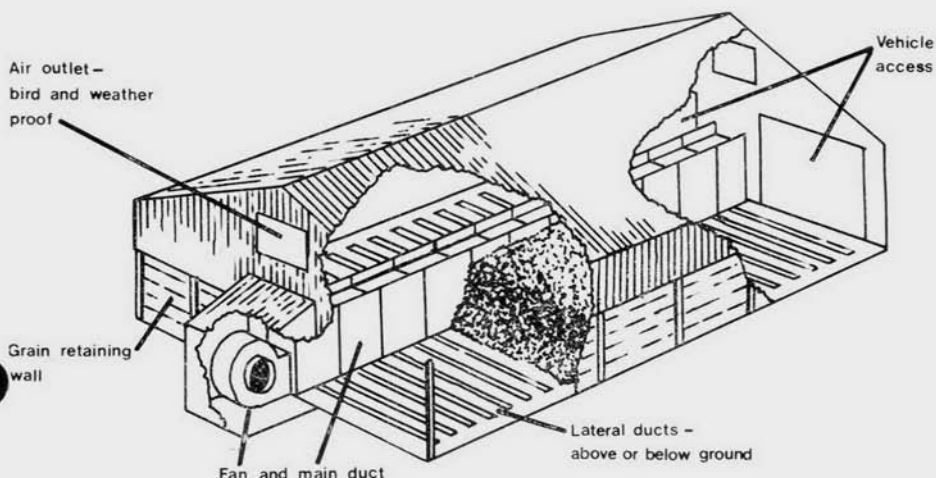


Fig. 2: Typical storage drying layout.

be dangerous to try to speed up drying by the use of too much heat in the early stages which can result in excessive drying of the grain in the lower layers and condensation of moisture in the cool grain above the drying zone creating a barrier to air flow. However, normal electrically driven fans can add 1°C or more to the ambient air temperature which is sufficient to reduce the relative humidity of the air by 6% or more. Therefore it is important to measure the relative humidity of the air in the duct. Artificial heat adding up to a 6°C temperature lift to the air may be safely used but only after the grain has been reduced to 18% moisture content by continuous blowing of ambient air.

HIGH TEMPERATURE DRYING

When air has an unsuitably high relative humidity for ambient air drying, the relative humidity can be lowered by raising the air temperature still further. This gives rise to high temperature drying of grain in continuous flow or batch driers where the grain can be dried quickly and cooled off immediately afterwards.

(Note: the added cost of fuel to run the drier, and the initial cost of the drier should

be borne in mind when contemplating this system).

The maximum permissible hot air temperature depends on the type of grain, its moisture content and intended use. The following Table 2, gives a guide to the maximum safe drying temperature which should be used.

GRAIN STORAGE SYSTEMS

The two main systems of grain storage found on farms are:-

- i) On-floor bulk storage, and
- ii) In-bin storage; be they round or square, and indoor or outdoor.

From the above sections it can be seen that we have the choice of either incorporating a drying facility within the storage building/bin or not. If a system of drying in one place and then storing in another is chosen it must be remembered that we must still incorporate some form of ventilation system within the store simply to help maintain the conditions of the stored grain. This ventilation system is called low volume aeration and is designed purely to control the temperature of the grain to within acceptable levels. As a ventilation rate of $0.0025\text{m}^3/\text{s/t}$ is required (i.e. $1/20\text{th}$ of that required for storage dry-

ing), a much smaller, simpler and hence cheaper ventilation system can be used.

ON FLOOR STORAGE

Figure 2 depicts a typical on-floor bulk store with storage drying capability. Any existing building can be adapted to suit this system but it is increasingly more common to find a purpose built structure.

Basically the system comprises a portal frame structure with suitable thrust walling and ventilation system. Air is distributed from a fan via a large main duct and thence through smaller ducts (laterals) placed on or cast into the floor. Generally grain is piled up to 3m deep in the case of storage drying systems or higher if the grain has already been dried. Without complicated design, laterals are restricted to about 11m in length and thus the overall span of a building with a main duct and laterals either side is 24m (i.e. allowing 1m width of main duct and 0.5m clearance between the thrust wall and lateral end, to avoid short circuiting of air).

(Note: Feeding properties are not harmed by temperatures up to 104°C but it may be difficult to cool the grain effectively prior to storage the higher the temperature used.)

The main advantages of the on-floor storage system are: the possible high rate of filling; the moderate cost; and the multi purpose use of the floor area when not storing grain. The main disadvantages are: difficult to separate parcels of grain; a high standard of management is required to avoid problems with mites etc; and unloading can be slow and complicated.

The on-floor storage system can be fully automated by the addition of air sweep floors and conveyors and elevators but there is a great danger of the investment failing to achieve economically the sophisticated handling ability of an integrated bin store.

SQUARE BIN STORAGE

Commonly this system comprises a double bank of bins with a central air duct between. The bins may be inside an existing building or free standing with an integral roof. Normally all the bins are fitted with drying floors and are self emptying. The store is filled and emptied via a system of elevators and conveyors, and grain cleaning facilities are often incorporated in the system. Grain is only restricted to 3m depth whilst drying otherwise it is common to store up to 6m depth. Generally, being a proprietary product they are available in a whole range of sizes to suit all needs.

The main advantages of this system are: grain movement fully automated; separate parcels of grain can be stored; low labour requirements; and handling throughputs can be high. The main disadvantage of this system is one of cost.

ROUND BIN STORAGE

Round bins may be erected outside, free standing or in a group (i.e. parallel lines or semi circular), or inside an existing building. Ventilation may be from the bottom upwards or from a central perforated cylinder radially outwards through the outer perforated wall. It is common for at least half the bins in a system to be fitted with drying floors and the rest equipped with ducting for low volume aeration. Similar restrictions or

Table 2. Safe drying temperatures.

GRAIN AND PURPOSE	MAX. AIR TEMP. (°C)
Grain for stock feed	82 — 104*
Wheat for milling	66
Malting barley and seed corn up to 24% m.c.	49
Malting barley and seed corn over 24% m.c.	43

SPRAY FOAM INSULATION

Cut Fuel Costs
Cut Condensation
Cut Feed Wastage

INCREASE PROFITS

Quotations and Advice are free so why not contact

ACEMEDAL LTD.

For a competitive quotation on **all** your thermal insulation requirements, from pig buildings, potato stores and poultry houses to processing plant.

BALLARDS BRIDGE FARM
West End, Mattishall Burgh, Norfolk, NR20 3RQ.
Telephone: (0362) 858152 Telex: 975247

THE BUILDING YOU'VE GOT IN MIND WE'VE GOT IN PRODUCTION

Haybarn, rootcrop or grainstore, covered yard or machinery shed - you know the building you need

And with over 20 years experience, we know how to satisfy that need quickly. The London Brick Buildings system is extremely flexible, and many of the components are already in stock.

That means we can give you exactly the building you want in a matter of weeks. We can handle the entire project from design and siteworks, or supply the basic structure for self erection, at a very competitive price.

Our latest large panel system, for example, could actually cut the cost of grain or rootcrop storage, and its golden flint finish blends well into the farm environment.

So call John Bowie on 0203 301301, and tell him what you're looking for. Because the building you've got in mind, we've got in production, right now.



LBBL

Please send me further information about LBBL agricultural buildings

NAME

COMPANY

POSITION

ADDRESS

TEL

Post to: John Bowie, LBBL Agricultural Division,
909 Leofric Works, Ryton, Coventry CV8 3ED

FREEPOST

ALL ROOFS
REPAIRED AND
WEATHER PROOFED BY
TECHNOPROOF
LTD

FREE SURVEYS AND REPORTS
FOR RE-CONDITIONING FARM
AND INDUSTRIAL BUILDINGS.

TECHNOPROOF COMPOUND
AND TREATMENT IS
GUARANTEED FOR 10 YEARS.

ESTABLISHED 1949



By appointment to
H.M. Queen Elizabeth II
Building Contractors
Technoproof Ltd
Lambourn, Herts.

ALL BUILDING
ELIGIBLE FOR FARM
CAPITAL GRANT

**ALL ENQUIRIES TO
LAMBOURN 71427 STD (0488)**

PABLO ERECTION SERVICES

Erection of Farm & Factory Buildings—Any Area

Repairs/Removal/Re-erection Concrete & Steel Buildings

FULLBROOK, LEDBURY ROAD, STAUNTON,
GLOUCESTERSHIRE

Telephone: (0452) 84279

depth apply to drying in these type of bins also.

Being available in a great range of sizes and materials it is possible to find round bins used as a very large co-operative type store, with sophisticated handling equipment similar to that found on an integrated square bin store, or as an emergency storage facility in times of bumper harvest.

The main advantages of a simple outdoor system are: relatively inexpensive; can handle small parcels of grain; and any problems can be confined. The main disadvantages are: moving grain between bins is often slow and difficult; out loading in bad weather sometimes not possible; and difficult to incorporate a cleaner.

FURTHER READING

It has only been possible to discuss a few basic principles of grain drying and storage

in this article, additional information can be obtained from the relevant publications listed below:—

1 Ministry of Agriculture Fisheries and Food — Grain drying and storage, booklets:

B 2415 — No 1 Grain Storage methods.

B 2416 — No 2 Bulk grain drying.

B 2417 — No 3 High temperature grain drying.

2 The Farm Electric Centre Handbook — Grain Drying and Storage.

3 British Standard Institution Code of Practice for the Design of Buildings and Structures for Agriculture — BS 5502, Part 2 Section 2.3 Storage, conditioning and processing buildings.

4 Farming Press Books — Drying and Storage of Combinable Crops by K. A. McLean.

HARE

Award Winning Farm Buildings and Structures

For over 40 years Hare have been manufacturing award winning farm buildings and ancillary structures in timber and steel.

Our comprehensive service covers all aspects from initial design through to final erection. Contact us now for a free estimate.

Midlands and N. England: Manor House, Snape, Bedale, N. Yorkshire
Tel: Bedale (0677) 70269 or 70300

Scotland: Traquair Road, Innerleithen, Peeblesshire
Tel: Innerleithen (0896) 830541

Hare Buildings  Timber Products Division





Computing Solutions to Farming Problems

- 18 years' experience as a major supplier to agribusiness.
- Specialised applications from food optimisation to complete farm management.
- Complete range of computer resources from micros to mainframe bureau.

Call our experts to discuss the most economic solution to your farming problems.



Unilever Computer Services Ltd.

Call us on 01-250 1500, or write to:

Unilever Computer Services Ltd., 5 St. John's Lane, London EC1M 4BH

Computers in farming

by R. J. Harvey

Unilever Computer Services Ltd.

Computing in the agricultural world is generally a very fragmented business. A number of enterprising organisations have encompassed the power of computing within their everyday environment but as yet the leap into information technology in the true sense has not occurred.

The farmer has traditionally had two forms of contact with the feed manufacturer, the Technical Advisor and the Sales Representative. The former uses a small microcomputer or terminal linked to a remote large computer to offer assistance to the farmer for feeding patterns etc. and the Representative uses similar devices to capture orders and provide up to date stock information. The manufacturer uses a large machine for the provision of order confirmation, invoices

and delivery and also perhaps for feed formulation, raw material analysis and finished product costing. Overlaying the whole of this system the farmer has his own small computer to run his accounts and to help with farm management.

From this view of the farming community a number of interesting points emerge. Firstly, that computing is very fragmented in the same way that the industry itself is very fragmented. In computing terms the individual applications can be very complex but there is no saving because of the lack of scaling factors in the ways those applications are applied. Secondly, that the farming community are advanced in their use of computers as tools to help with everyday tasks compared with a large number of other indust-

farmdata

AGRICULTURAL COMPUTING SPECIALISTS

Complete systems for farmers and estate owners with programs for:

Dairy Herd Management

(including Pedigree and Young Stock Records)

Pig Management — Breeding and Fattening

Farm Costing, Accounts and Budgeting

Retail Dairy Operations

Estate and Property Management

FARMDATA LTD.

30 MARKET SQUARE, OLD MELDRUM, ABERDEENSHIRE AB5 0AA

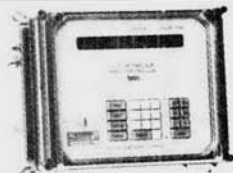
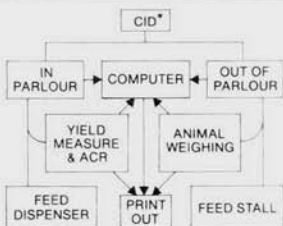
Telephone 065-12-2807 and 2667



HUNDAY

electronics in agriculture

Each component part of the Hunday Livestock Management package is an advanced piece of agricultural technology. Individually they are reliable and practical, collectively they link up to form the most modern, tested and proven Livestock System available today.



PROGRAMMABLE OUT OF PARLOUR FEED CONTROL UNIT

Can be installed up to 1,000 metres cable length from the cow feeding stall with the ideal location being the farm office. A standard keyboard is incorporated to enter the cow identity, transponder number and appropriate ration for the feeding program.

HUNDAY ELECTRONICS LTD.,

Samson Close, Killingworth, Newcastle upon Tyne NE12 0DX.

TEL: (0632) 685828 Telex: 537630 G

BBS and Digital set the standard

for farmers on micros, minis and super minis

BBS A company with nearly a century of agricultural experience behind it.

Digital The second largest computer manufacturer in the world.

Together we can offer the best farming computer systems available today.

With the new digital personal computers even the smaller farmer can reap the benefits of experienced software on powerful hardware at cost efficient prices and industry leading maintenance charges.



**Phone Chichester
(0243) 775111**

To prove we set the standard for farmers on the full Digital range—Personal, PDP11 and VAX computers.

Bartholomews Business Systems, Portfield, Chichester, West Sussex

ries and following on from that appear ready to accept new technology into their working environment as long as it acts as an aid to productivity. On larger farms computers are already being used for data recording and for livestock control. Has the time arrived when the farming community is ready poised to integrate the appropriate systems and to harness the benefits of Information Technology?

I would therefore propose that over the next five years the farming community will be seeking a radical integration of techniques to improve productivity. Is it really necessary to have all these specialists and representatives when what the farmer really needs is a small microcomputer that can be used to access the relevant software and to place orders etc as appropriate? Such a device can also be used to undertake local farm management tasks, provide data for larger farm management systems running on other computers and to receive information from other sources, for example in the feed manufacturers case new product launches and special offers. This approach would put the power of the computer in the hands of the people who best know what they are looking for — the farmers themselves.

In order for this integration of systems to take place there are four main technological requirements all of which are available today.

There is a need for farmers to have small intelligent computers to handle the tasks which are most sensibly handled locally. There is a need for a large central computer which can communicate with the small local machines and which can be used for large applications where many people wish to consolidate data. There is a need for computer software which will run on these machines, both the large and the small, and which is understandable by the farmer and finally there is a need for a communication device, in computing terms a network, which will enable these machines to 'talk to' one another be it from farm A to farm B or from farm A and B to the large machine. Find all these ingredients in the right mix and you are well on the way to finding a productive solution to the problem.



agricultural COMPUTER SERVICES

**"A COMPUTER WILL
SOON BE PART OF
YOUR BUSINESS"**

*Make sure you have the
right Programs!*

**'A.C.S.' Design Develop
Programs for farmers:-**

'Agriman'—Financial and Management Control System for the farmer

'Cropman'—Field returns, margin analysis per field etc.

'Dairyman'—Individual cow performance information, milk production, feed costs, detailed breeding records

'Pigman'—recording information on up to 700 sows and boars

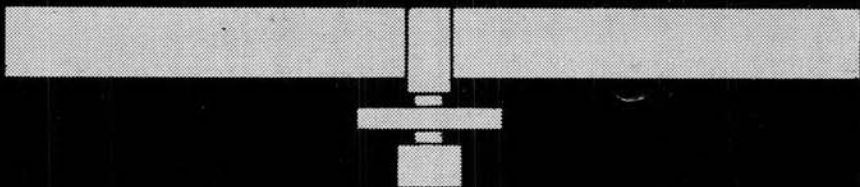
'Payroll'—Works out your weekly payroll in as little as 45 seconds!

'Beefman'—Animal records, performance monitoring

**CONTACT A.C.S. TODAY
FOR FURTHER
INFORMATION**

**Agricultural Computer Services,
Roundabout Farm, Thurning,
Norfolk NR20 5QS
Tel: Melton Constable (0263) 860847**

— THINKING — CROP SPRAYERS?



Think of **Evers & Wall Ltd.**

the company with the pedestrian, tractor-mounted and trailed ranges to suit all purposes and the know how to back up those vital sales.

New mounted & trailed models supplement well tried existing sprayer ranges for 1983.

Designed for professionals by professionals.

So, if you want a deal for your customer that is both profitable and rewarding get on to Evers & Wall Ltd right away.

We're only a 'phone call away on (0203) 372054

*Which ever way you look at it Hardi Sprayers
from Evers & Wall make a lot of good sense.*



**Evers & Wall Ltd., St. Georges Way,
Bermuda Industrial Estate, Nuneaton, Warwicks.**

Agricultural machinery

by Kenneth Pawley, MIPR

Information Officer, British Agricultural and Garden Machinery Association Ltd.

Last year saw a rise in investment by United Kingdom farmers in machinery and equipment in the region of 26 per cent, but this must be viewed in the context of the previous year's figure which was the lowest for more than 20 years.

Statistics in the Annual Review of Agriculture support the opinion that farmers are under-equipped, particularly where large capital machines like tractors and combine harvesters are concerned; in most other inputs investment has been fairly steady in real terms over recent years, but the high-cost items have been used as a means of regulating expenditure flow.

Developments

In these circumstances, it is surprising that manufacturers offer something like 350 models of tractor from which to choose. Four-wheel drive (4WD) has increased in popularity, rising in six years from nine to 39 per cent of registrations — in fact farmers now have a greater choice in this configuration than in two-wheel drive. Reasons for the change are varied, but the principal one is that tractor power has gone up during this period from an average of 68 to the current level of 80. Drive to the front wheels improves traction, offering higher output on heavy draught work and giving the opportunity to exploit full power when needed; there is absence of the resistance normal from undriven front wheels and main wheels and front wheels use the same tracks. Other advantages which could be suggested include added breaking effect from all-driven wheels and more efficient operation of front-mounted equipment. The several types of 4WD fall into two categories, those with smaller front wheels and those with equal-sized wheels, the former often being a derivation of the 2WD tractor and serving as multi-purpose machines as opposed to the heavy pulling role of the latter. Among the

equal-sized wheel types come variations such as conventional front steering, all wheels steered, and pivot steering.

The layout of large diameter wheels on one driven axle is a satisfactory way of transmitting power provided the weight on them is sufficient, they are of optimum size for the work intended and tyres are correctly inflated. Fitting larger tyres and ballasting them or the rear axle, is a flexible arrangement which many farmers use, allowing lighter or heavier work from the same tractor through a relatively simple change-over operation.

Working in the field

In recent years a new concept in combine harvester design has been introduced. At the 1978 Royal Smithfield Show the rotary combine was shown and aroused a great deal of interest, together with doubts as to whether the feeder and rotor sections of the machines could cope with conditions in this country and concern about damage to the straw in the threshing process. Field tests and an independent survey and assessment of performance by the National Institute of Agricultural Engineering at Silsoe showed that with the correct driving technique, potential could be up to 40 per cent greater than with a conventional combine of similar header width. Other manufacturers have developed improvements in the separation system of conventional machines, particularly on the large capacity models.

Innovations in ploughing include the front-mounted type. By putting a plough at the front and at the rear of the tractor, greater working flexibility is possible. More powerful tractors permit multiple cultivations in one pass using different tools at each end.

There has also been a dramatic change in baler design, conventional small balers falling to the onslaught of the big baler. Round

OLDMAN AGRICULTURAL LTD.

Unit Four, Saint Ives Industrial Estate,
Nuffield Road, Saint Ives,
Huntingdon, Cambridgeshire,
PE17 4BQ

J.R.T. AGRICULTURAL

**THE BUILDINGS, FLECKNEY ROAD, KIBWORTH,
LEICESTER**

**BALE TRAILERS—LOWLOADERS etc. MADE TO YOUR
REQUIREMENTS.**

**MANUFACTURERS OF ALL AGRICULTURAL
EQUIPMENT, INCLUDING: FEED BARRIERS, RACKS
GATES, ALL TYPES OF LOADER FORKS AND
BUCKETS etc.**

**KIBWORTH (053753) 3567 works
LEICESTER (0533) 403667**

dealers are moving from the use of belts to enclosed chambers with rollers and a new model producing high-density rectangular bales is available.

The traditional hydraulic nozzle sprayer is being challenged by electrostatic sprayers, controlled droplet applicators and, in orchards, rotary cage atomisers — the latter technique having been used for many years for aerial spraying. One of the claimed advantages here is the penetration through dense crops brought about by the airblast from the fan blades.

With machines becoming more sophisticated and more expensive, a farmer cannot afford to have equipment broken down and out of use. He looks to his dealer for an efficient service that will get him back to work in the field with minimum of delay.

How British Agricultural and Garden Machinery Association sets the standards

Members of the Association have as their logo a gear wheel on which is written 'Sym-

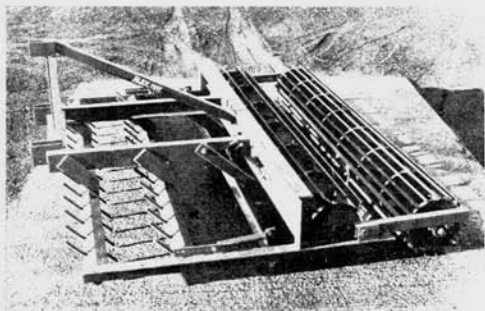
bol of Service'. That sums up the attitude of the members towards their customers and the aims of this trade association which represents them.

Why should membership of BAGMA by his supplier be of interest to a farmer? For the very valid reason that the Association sets and maintains high standards. Members are not just paying a subscription to join a club, but are vetted and approved as suitable because of their commitment to the industry in terms of skilled personnel, stocks of new machines and spare parts, appropriately equipped workshops and facilities, adequate transport and back-up office staff.

Admission procedure

Minimum qualifications for membership are clearly spelled out according to the type of business being carried on, with nine classifications. Many members' activities cover several of these categories, since they may have specialist departments handling new horticultural machinery; stock new agricultural tractors, machinery and implements;

Manufacturer of:—
Harrowing Levellers
Minimum Cultivation
Cultivators
Bale Transporters
Potato Box Transporters
All purpose mobile feeders
Cattle feed rings
Feeder on skids



ALEX G. HAY

AGRICULTURAL ENGINEER

WHITECAIRNS, ABERDEENSHIRE AB4 0UP

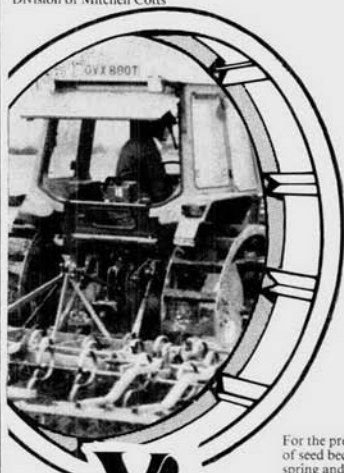
Telephone: (065 17) 2311

**YOU'VE SEEN THE REST NOW BUY CABCRAFT'S
YIELDWHEEL, PROVEN TO COMPACT THE
SEED BED LESS**

- COMPACTION REDUCED BY 160% WHEN COMPARED WITH DUAL CAGE OR SINGLE WHEELS
- AERATION IMPROVED BY 95% WHEN COMPARED WITH DUAL CAGE OR SINGLE WHEELS
- MANUFACTURED IN ONE DIAMETER AND WIDTH TO FIT ALL UK MANUFACTURERS' TRACTORS OF 45 to 100 HP
- EASY FITTING, NO CLAMPS OR LUGS, FITS IN PLACE OF THE REAR TRACTOR WHEEL
- FOR THE FULL FACTS SEE YOUR DEALER OR CONTACT:-

Cabcraft

A company in the Engineering
Division of Mitchell Cotts



For the preparation
of seed beds in the
spring and autumn.

The **YIELDWHEEL**
by Cab-Craft

CABCRAFT LTD.

**FOUR ASHES INDUSTRIAL
ESTATE,**

**FOUR ASHES, WOLVERHAMPTON,
STAFFORDSHIRE, ENGLAND**

Telephone: (0902) 790671

Telex: 337392

carry out specialist installations with staff to design, advise on and execute such work. Of recent years, more members have started specialist departments stocking new chainsaws and allied equipment.

Companies which apply for membership are required to complete a detailed Application Form and return it to BAGMA Headquarters at Rickmansworth in Hertfordshire. After checking — which includes stock levels of new machines and new spares — Headquarters asks the local Branch Chairman to appoint an Inspection Committee to visit the premises and verify the information given. The Inspection Committee describe the role of the Association to the prospective member and the responsibilities as well as the benefits of joining. For example, his premises have to be open and staffed at all reasonable hours all the year round, mainly for supply and service to customers.

When the Application Form is received back at Rickmansworth, the Inspection Committee recommendation is notified to the Branch

Secretary for the next Branch meeting. The Branch determines the suitability of the applicant and recommends to the Council of the Association election and classification, or refusal.

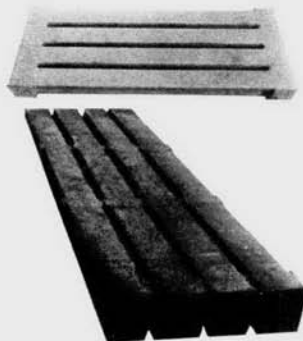
Structure

Mention has been made of the Council and Branches and some amplification may be helpful. The country is divided into 22 Regions and Branches, each with its own officers. Regular meetings are held, often with guest speakers from associated organisations in agriculture and horticulture, thus enabling members to keep in touch with one another and allied interests. Representatives on Council report to these local meetings and, in turn, receive the views of members for guidance. Council conducts and manages the business of the Association and appoints Committees which report to it.

Since removal of the trade from the scope of the Road Transport Industry Training Board, BAGMA is responsible for training in the trade. The Education and Training Com-

SANGWIN SLATS

FOR



- ★ Cattle and Pigs
- ★ Single and multiple manufacture
- ★ Tractor loading
- ★ Up to 11ft. span
- ★ Square and round edges
- ★ Conforming to BS 5502
- ★ Also high quality concrete fence posts

SANGWIN CONCRETE PRODUCTS LTD.

Kelsey Hill, Burstwick, Nr. Hull

Telephone: (09644) 2339

mittee, representative of all areas of the country and interests, has produced a Model National Scheme of foundation training and education with guidelines for land based servicing skills under the Youth Training Scheme. BAGMA has had contact with technical colleges for a great many years and has arranged appropriate courses, working with the City and Guilds of London Institute and SCOTEC. The Association administers the National Joint Apprenticeship Council for the industry and, through the National College of Agricultural Engineering at Silsoe, offers the BAGMA Trade Diploma Course.

Activity

The Association traces its beginnings back to 1917, when it was formed to combat unfair dealing, the dumping of implements on an already overstocked market and similar problems that might have closed down members' businesses with consequent loss of jobs. Many of the companies that played prominent roles in those days are still in membership.

In 1966, the Association amalgamated with the Scottish Agricultural Machinery Association and later formed a Garden Machinery Division to look after the interests of specialist dealers.

As mentioned in the opening paragraph, BAGMA itself is a service to the members. Headquarters staff deal with thousands of enquiries a year, with support from consultants on industrial relations and insurance matters. Members are kept advised by newsletters, a monthly magazine entitled AGM Service, seminars, a National Meeting for garden machinery members and an Annual Convention.

BAGMA is sponsored by the Department of Industry, keeps in close touch with many other Government Departments and is consulted by countless organisations on matters of mutual interest.

Its aim for the future is to provide a standard of service to members that customers expect from them.

WE'RE TAKING OUR TYRES TO MARKET.

In true farming tradition, we're inviting you to haggle over the price of your new tractor tyres.

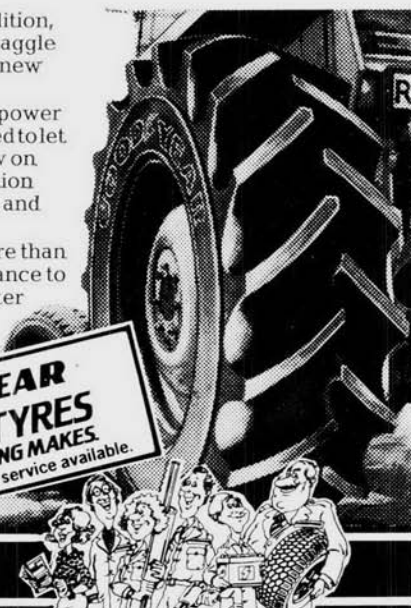
For our big buying power means we'll be prepared to let the price get really low on Goodyear Super-Traction Radials for both fronts and rears.

And, if you buy more than one, we'll give you chance to barter for an even better deal.

Now that's worth talking about.

GOODYEAR
TRACTOR TYRES
AND OTHER LEADING MAKES.
Full ballasting and fitting service available.

TYRESERVICES GREAT BRITAIN



EVERYONE'S FAVOURITE TEAM.

Find us in the YELLOW PAGES.

Pest damage is more than chicken feed

by Peter L. G. Bateman, FRES
Director, Rentokil Ltd.

Several farm workers die from Weil's Disease each year, and animals can be infected by a wide range of rat-borne diseases.

Rats and mice living in poultry houses can play havoc with egg production, cause panic among the birds, damage drinking troughs, plastic pipes and woodwork, spread disease and destroy or soil large amounts of feed.

They take eggs and chicks and gnaw cables and insulation, and in piggeries they upset farrowing sows, prevent weight gain and damage insulation.

No poultry farmer is entirely safe from the depredations of these rodents, whether they take eggs or chicks from a smallholding or live in the dropping pits under California poultry houses.

Not long ago the owner of an isolated breeder unit in a building 120 ft. by 250 ft. was putting down two cwt. of grain-based rat bait a night. A professional treatment by a pest control contractor who was called in resulted in 3,000 dead rats being found. Many others would have died undetected.

Surprisingly such infestations are rare, but the breeding potential of a pair of rats with plenty of food and shelter available should not be underestimated. If all their offspring survived and bred, there would be over 600 rats within a year.

Big bag silage is often ruined by rats gnawing holes in the bags.

In spring rats uproot seed barley and other germinating grain.

In Winter, as the grain and root crops disappear from the fields, more rats seek har-

bourage, food and shelter in farm buildings.

If there are holes in the structure of buildings, young chicks, eggs or food may actually be dragged out through them by rats living outside. Indeed, most of the rats spend the daytime foraging in the surrounding area, moving into the house at night.

Control measures must be directed at wherever the rats are to be found. Outside burrows and rat holes can be treated by specialist contractors with Phostoxin pellets of aluminium phosphide, which release phosphine gas on contact with damp soil.

Perimeter baiting outside buildings is best done with carefully placed baits based on bromadiolone or difenacoum — effective successors to warfarin and with a better success rate.

Liquid rodenticides are also useful as rats need to drink, and there is a dusting powder formulation that can be puffed into wall and floor cavities, so that rats pick it up on their feet and fur, lick it off in the course of grooming and die. Bromadiolone is available as 'Slaymor' from agricultural merchants.

Rats in the roof are difficult to get at, but a gel formulation of difenacoum or bromadiolone placed around the holes and downpipes through which they enter and leave the roof is often effective. Again, this adheres to the body hairs and the rat dies as it licks it off.

Both Black Rats and Brown Rats can be particularly destructive to polystyrene or plastic foam roof insulation, reducing it to shreds in a few nights. Their habit of gnawing power cables, stripping off the insulation, can also be highly dangerous.

Thirty-eight cows were recently electrocuted when a rat stripped bare an electric cable which touched the pipe feeding their water trough. The incident cost the farmer £20,000.

Inside the poultry houses, baits must be placed so that they are accessible to the rats but not to the birds. They can be placed on the aisles and walkways in battery units or in bags lowered into dropping pits.

Mice are probably less of a problem now than they were at the height of the warfarin-resistance time before new rodenticides such as alphachloralose, calciferol, bromadiolone, difenacoum and brodifacoum were developed.

Tales of aggressive house mice eating holes in live pullets in intensive breeding units belong, we hope to the past, but mice are still a serious nuisance, particularly in egg packing stations, to which they are often inadvertently sent along with the eggs from the producer farmers.

Apart from damaging eggs and egg boxes, they tend to disrupt the smooth flow of operations when they expose themselves to girls on the grading and packing machines.

Proofing of buildings is a prudent precaution and, as far as possible, all holes in woodwork should be covered and where gnawing is persistent, metal sheet must be used. Gaps beneath doors should be sealed and holes in concrete filled with coarse wire wool embedded in cement.

'Good Housekeeping' in terms of waste disposal, correct storage of feed, elimination of weed growth and rubbish, and care to avoid undue spillage of feed, will help to minimise risks of rodent infestation.

Selecting and applying the best rodenticide for each location, and the regular detailed inspection for signs of rats and mice is a skilled operation and can be most safely entrusted to a reputable pest control servicing company.

It will almost certainly be 'chickenfeed' compared with the cost of damage and losses caused by living-in rats or mice, and for pig farmers can help save their bacon.

Fish Farms are also vulnerable to rat damage. Calverton fish farm, with 49 ponds covering about 8 acres was one of forty such farms affected last year by Whirling Disease. Under the direction of a MAFF Fisheries Officer, a special team from Rentokil's pest control service carried out an intensive disinfection programme after the most valuable brood fish had been transferred to other fisheries and many trout and coarse fish sold for the table or destroyed.

Whirling Disease is caused by a micro-organism that bores through the skulls of young trout, attacks the nervous system and causes the fish to swim in erratic circles until they lose weight and eventually die. The organism lurks in the mud and silt on the bottom of the breeding ponds or reservoirs and control consists of thorough disinfection of the site and raising the soil PH value to a highly alkaline reading of about 10.

At Calverton, hundreds of rats were an additional hazard, transmitting the disease along the banks of the ponds and feeding on the sick fish.

Because the rats enjoyed a fish diet, conventional bromadiolone baits did not work until the pest controllers laced them with cod liver oil. Dead rats were then found throughout the area.

Grain pests on farms include Grain Weevils and Saw-Toothed Grain Beetles (*Sitophilus* and *Oryzaephilus*) in silos and granaries. Fumigation may be necessary if the infestation is serious but damage can be avoided by proper cleaning and spraying of silos before fresh grain is introduced.

Wherever bulk flour, grain, cereals or other dry food commodities are stored in bins or silos there is a risk of insect infestation, moulds, and other problems building up the residues that accumulate in the structure. Store any such commodity for long enough and something nasty on six legs will come and live in it. *Sitophilus* in the silo can be expensive by causing 'hot spots' in the grain which then goes mouldy.

A complete nationwide silo-cleaning service for farmers is now provided by the combined experience of industrial hygiene teams with the knowledge of pest control entomologists and technicians to ensure that treatment is safe and effective.

Special cradles, winches, hemp rope harn-

All rodents

Moles

All insects

Competitive rates

J. A. Bowles & Son

PEST CONTROL

West Wellow (0794) 22516

Specialist in controlling all types of pests in Poultry units, Pig units, Covered yards, Grain silos and stores, etc., using micro and pressure spraying.

OAKLANDS, PLAITFORD, ROMSEY SO5 0EJ

RATS, MICE AND INSECT PESTS ARE A
WASTE OF TIME AND MONEY

... YOUR TIME AND MONEY

Ring **RENTOKIL** for the control of

FLIES - WASPS - SPARROWS

RATS - MOLES - INSECTS

MICE - STARLINGS

Ring **RENTOKIL**—We're in every phone book

ess, non-static equipment, sealed-beam lighting and flame-proofed vacuum cleaners are used to remove dust and residues from even the least accessible parts of a silo and building structure so that pest control and quality demands are fulfilled. Appropriate residual insecticides are applied to minimise the risk of re-infestation. Customers See No Weevil, Hear No Weevil, Think No Weevil.

If fumigation of infested grain is necessary, specialists will use methyl bromide or phosphine.

Flies in animal houses cause distress to stock and spread disease. Piggeries, poultry houses, milking parlours and stables all need fly control measures.

Lucretia Borgia was an amateur at food poisoning compared with **Musca domestica**, the Common House Fly.

Every Summer, fly-borne illness brings misery or discomfort to farmers and livestock. The insects themselves step up their breeding rate and become a constant contaminating menace to any place where food is left exposed, and wherever there is accumulated organic matter such as manure. One House Fly carries several million bacteria on or within its body as it commutes from filth to food. In warm weather its life cycle from egg to adult is completed in a week. The Stable Fly, similar in appearance can inflict an irritating bite.

In addition, the blowflies, which include the Bluebottle and Flesh Fly usually make themselves objectionably obvious by their large size and buzzing flight, but are still too often tolerated, as is the Lesser House Fly cruising around Poultry Houses with sudden changes of direction. All of them will wipe their filthy feet on any food they land on.

One sensible precaution for the farmhouse is to fit fly screens over windows so that you can throw open wide your windows, even after dark, without fear of being overwhelmed by hordes of flying insects.

Forms of light, elegant fly-proofing of windows, such as Cli-pon have been developed which keep out all flying insects yet let fresh air in and allow easy access to the windows for opening or cleaning.

In premises such as dairies, pest control services can fit fly screens and will take other steps to deal with any flies that still get in.

A specially formulated insecticide can be applied to wall surfaces by the contractor's staff, usually as part of a servicing contract. Other fly killers can be applied to farrowing pens and similar vulnerable areas, and dropping pits can be treated.

Indoors, flies can be killed by a suspended lantern device which attracts them to its ultra-violet light, electrocutes them as they touch the surrounding bars and drops them into a catching tray. One such device, the Rentoflash can be wall mounted or suspended from the ceiling.

In order to give such techniques a chance, however, 'good house-keeping' is essential. Larger potential breeding grounds of flies must also be treated. Pest control contractors will spray refuse tips and waste disposal areas to cut across the flies' breeding circle. Three scientists who examined over 300,000 house flies found that each fly from a slum area carried an average of $3\frac{1}{2}$ million bacteria. Flies from the cleanest areas each had an average of 'only' 1,941,000 bacteria! One female house fly may lay between 600 and 900 eggs in a fortnight.

Theoretically, if all survived and bred, the offspring of a pair of flies that mated in April would total 191,010,000,000,000,000 by August, covering the Earth's surface to a depth of over 40 feet.

Recent signs of resistance to pyrethroids by flies in animal houses has led MAFF to recommend these are no longer used in farm buildings but there are two effective alternatives currently in use by pest control servicing companies, one of them a bait which incorporates an attractive material to keep the fly on the surface long enough to ensure that it receives a lethal dose. Both methomyl and azamethiphos are best used painted on to areas where flies most often land or concentrate.

Control of pests in farm buildings is a specialist task and needs the attention of well-trained staff. A list of pest control contractors is available from The British Pest Control Association, Alembic House, 93 Albert Embankment, London, SE1.

A reputable nation-wide pest control company offers free surveys of farm buildings so it costs nothing to find out what a professional farm pest control service, with regular inspections and treatments, will cost.

Road haulage and agriculture

by Ana Poulton

Road Haulage Association

Each day the British road haulage industry carries Britain's industrial and agricultural goods to customers in Britain, Europe and beyond. In 1981 — the last year for which complete figures are available — transport customers spent £18,662 millions on freight transport, almost 96 per cent of the overall total. This is an indication of the utter reliance placed on haulage by British manufacturing and farming industry.

The professional haulier provides a complete service which relieves customers of the need to consider any of the many and complicated aspects of running their own fleet of vehicles. The haulier will undertake to transport a load and to take on the full responsibilities involved.

Agricultural produce constitutes a substantial proportion of road haulage traffic and many different types of vehicles and equipment are required for the purpose ranging from a tipping vehicle for sugar beet to the pneumatic discharge vehicle for bulk delivery of animal feed. Farmers rely heavily on hauliers for the transportation of grain, livestock, etc to all the major markets, ports and factories throughout the country. Farmers usually prefer to use the flexibility and expertise of the hire-or-reward haulier largely because of the long distances which farm produce now has to be taken and also because of the sheer volume of produce which has to be carried.

For most farmers the advantages of hiring the services of a professional haulier far outweigh those of buying their own vehicle fleet, which can be very costly in terms of maintenance and workshop facilities etc. This is especially true for farmers who grow seasonal crops such as, wheat, sugar beet and barley, where the services of independent hauliers can be brought in for the season, thus avoiding the burden of dormant vehicles throughout the rest of the year.

The transportation of livestock can be divided into two main groups. The majority of hauliers transport general livestock, such as sheep, pigs and cattle to and from the markets. These hauliers are practised and experienced in the correct carriage of animals and take full responsibility for delivering them safely. In the predominantly sheep farming areas of Scotland and Wales hauliers play an important role in transporting livestock from farms which are often remotely placed compared with other parts of the country. Then there are those hauliers who specialise in transporting bloodstock and 'exotic' animals, such as deer and goats. This type of operation requires a thorough knowledge of the special regulations governing the carriage of livestock, ie The Transit of Animals (Road and Rail) Order 1975, which covers sheep, cattle, swine, goats and horses; and specialised regulations such as The Movement and Sale of Pigs Order 1975 and the Live Poultry (restrictions) Order 1971.

Due to the recession, more farmers are tending to use their own vehicles for transportation. Quite often a farmer will use a land rover and a trailer to carry a few animals to market. However, only the haulier can cope with the vast bulk of the produce.

Every year hauliers carry millions of tonnes of grain and sugar beet through regular seasonal contracts with local farmers. Sugar beet and grain can be carried in an ordinary tipping vehicle which the haulier uses to carry other goods such as, road stones or coal throughout the rest of the year. The timing and conditions of loading and delivery are usually negotiated on a one-to-one basis between haulier and farm manager. The operation of the yearly sugar beet 'campaign', however, is negotiated through regionally based sugar beet committees upon which hauliers are also represented. These committees decide upon the level of rates

with the British Sugar Corporation; decide how much can be transported each day, how to allocate permits, pick-up times, destinations etc.

Dairy produce such as milk, which used to be transported in churns on the back of simple trailers, is now carried in 16-tonne bulk collection tankers designed mostly for taking the product to the local dairy for processing. Larger quantities of milk are taken on longer cross-country journeys by the articulated 32-tonne tank vehicles. Although the Milk Marketing Board carries the chief responsibility for the collection and delivery of milk, a large proportion is still collected by hire-or-reward hauliers who can provide the Board with operational flexibility.

The link in economic and business interests between farmers and hire-or-reward

hauliers is demonstrated by the Road Haulage Association's Agricultural Functional Group. Via this group hauliers co-operate with the National Farmers Union to discuss matters of common interest and to plan meetings with the Ministry of Agriculture and the Department of Transport to discuss the repercussions of new legislation on the carriage of agricultural produce and problems relating to the efficiency of farm collections and market deliveries. Most recently the NFU and the RHA combined to put pressure on the Department of Transport to relax the overloading law by providing a clause of 'due diligence'. So far this has been unsuccessful but the campaign continues. Likewise the RHA's Livestock Hauliers' Functional Group also co-operates with the NFU and the Ministry of Agriculture to discuss any important points of new legislation which may affect the efficient carriage of animals.

Express Deliveries (COVENTRY)



* Low Loaders

* Artics & Rigid

* Vehicles 1-22 Tons

Regular runs to: LONDON, -

LIVERPOOL - MANCHESTER -

MAIDSTONE - GLASGOW

Specialists in machinery movement and silos

LAPWORTH 2303

Brookside Grange, Oldwich Lane West,
Chadwick End, Solihull, West Midlands B93 0BJ

Crop Protection Chemicals

Suppliers & Manufacturers

Advertisers are printed in bold type.

Agri-Chemicals (SW) Ltd.
The Agronomy Centre, Willand,
Cullompton, Devon EX15 2RF.
Tel: (0884) 820204

Agrichem Ltd.
First Drove, Fengate, Peterborough,
Cambridgeshire PE1 5BJ.
Tel: (0733) 47881. Telex: 32888

Agricultural Spraying Company Ltd.
Colne Road, Bures, Suffolk.
Tel: (0787) 227584

Arable Aids (Enstone) Ltd.
Enstone Airfield, Bicester Road, Enstone,
Oxon OX7 4NP.
Tel: (060872) 693

Arable Bulb Chemicals Ltd.
Main Road, Butterwick, Nr. Boston,
Lincolnshire PE22 0JW.
Tel: (0205) 760479/760470

Armillatox
The Old Malt House, Well Street,
Brassington, Derby, Derbyshire.
Tel: (0332) 841151

BASF United Kingdom Ltd.
8 The Market Place, Market Deeping,
Peterborough PE6 8EA.
Tel: (0778) 346343

Bayer UK Ltd.
Hutton Bank, Ripon, North Yorkshire HG4
5DW.
Tel: (0765) 700684

Bayer UK Ltd.
Agrochem Division, Eastern Way, Bury St
Edmunds, Suffolk IP32 7AH.
Tel: (0284) 63200. Telex: 81301

Bayer UK Ltd.
Agrochem Division, 3 The Tan Yard,
Bromyard, Herefordshire HR7 4DB.
Tel: (0885) 82331. Telex: 35440

Bayer UK Ltd.
Agrochem Division, Bridgend, Kinross
KY13 7ER.
Tel: (0577) 62170. Telex: 76583

Bayer UK Ltd.
Wireless Hill, South Luffenham, Oakham,
Leicestershire LE15 8NF.
Tel: (0780) 720027

Boehringer Ingelheim Ltd.
Ellesfield Avenue, Bracknell, Berkshire
RG12 4YS.
Tel: (0344) 24600

Borax Holdings
Borax House, Carlisle Place, London
SW1P 1HT.
Tel: (01) 834 9070

BOS Chemicals Ltd
Paget Hall, Tydd St Giles, Wisbech,
Cambridgeshire PE13 5FL.
Tel: (0945) 870014. Telex: 32719

Chafer, J. W., Ltd.
Chafer House, 19 Thorne Road, Doncaster,
South Yorkshire DN1 2HQ.
Tel: (0302) 67371. Telex: 547132

Chemicals Trading Company Ltd.
25 Berkeley Square, London W1X 6DH.
Tel: (01) 499 1246. Telex: 261454

Cleanacres Ltd.
Andoversford, Cheltenham, Gloucestershire.
Tel: (024282) 481. Telex: 43272

Craven Chemical Company Ltd.
20 Church Street, Evesham, Worcestershire.
Tel: (0386) 2631/2



T.G. Roddick & Co.Ltd

**GRAIN, POTATO,
SOYA BEAN MEAL
AND SOYA BEAN OIL
FUTURES BROKERS**

World Trade Centre, East Smithfield,
London E1 9AA.
Tel: 01-488 0191. Telex: 884 779.

Norwich House, Rumford Street,
Liverpool L2 8TA.
Tel: 051-227 4561. Telex: 629517.

Mobile Seedcleaning Services

STIBBINGTON, PETERBOROUGH

Tel.: Stamford (0780) 782705

SERVICES

On-Farm Seed Production — Full range of dressings available
Grain cleaning — for intervention, malting etc.

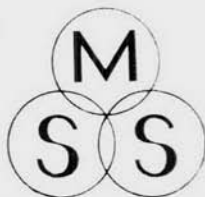
MANUFACTURING

Mobile seedcleaning machines, seed treatment equipment,
Grain sampling equipment, temperature probes.

MARKETING

Moisture meters, temperature probes, grain samplers,
Hectolitre testers, automatic grain counters.

Deal with the Professionals !



Du Pont (UK) Ltd.
Agrichemicals Department, Wedgwood Way,
Stevenage, Hertfordshire SG1 4QN.
Tel: (0438) 734457. Telex: 825591

Ellis, Edward and Son
87 High Street, Pwllheli, Gwynedd.
Tel: (0758) 613147

FBC Limited
Hauxton, Cambridge CB2 5HU.
Tel: (0223) 870312. Telex: 81654

FBC Limited
UK Agriculture Head Office, Nottingham
Road, Stapleford, Nottingham NG9 8AJ.
Tel: (0602) 390202. Telex: 37487

Fortnum Farm Chemicals Ltd.
63 Queen Street, Castle Douglas, Scotland
DG7 1HS.
Tel: (0556) 2744/3166

H.L. (Chemicals) Group
Key & Pell Limited
Farmwork Services (Eastern) Limited,
Northons Lane, Holbeach, Spalding,
Lincolnshire PE12 7QA.
Tel: (0406) 22666

Hamman Agricultural Services Ltd.
2 High Street, Presteigne, Powys LD8 2BA.
Tel: (05444) 267000

Helm Great Britain Chemicals Ltd.
91-93 Baker Street, London W1M 1FA.
Tel: (01) 487 5341. Telex: 261372

Hoechst UK Ltd.
East Winch Hall, East Winch, Kings Lynn,
Norfolk PE32 1HN.
Tel: (0553) 841581. Telex: 81360

Imperial Chemical Industries PLC
Plant Protection Division (UK Department),
Woolmead House, Bear Lane, Farnham,
Surrey GU9 7UB.
Tel: (0252) 724525. Telex: 85279/858512

Interlates Ltd.
Gladden Place, Skelmersdale, Lancashire
WN8 9SX.
Tel: (0695) 33535. Telex: 627672

London Chemical Co. Ltd.
Craven House, 121 Kingsway, London
WC2B 6PR.
Tel: (01) 631 6651. Telex: 25517

Mandops (Agrochemical Specialists) Ltd.
Tower Industrial Estate, Chickenhall Lane,
Eastleigh, Hampshire SO5 5NZ.
Tel: (0703) 641826. Telex: 47119

Marks, A. H., and Co. Ltd.
Wyke Lane, Wyke, Bradford, West Yorkshire
BD12 9EJ.
Tel: (0274) 675231. Telex: 51653

Maxicrop International Ltd.
21 London Road, Great Shelford, Cambridge
CB2 5DF.
Tel: (0223) 844024. Telex: 81277

May and Baker Agrochemicals
Regent House, Hubert Road, Brentwood,
Essex CM14 4QQ.
Tel: (0277) 230522. Telex: 28691

Monsanto PLC (Agricultural Division)
Thames Tower, Burleys Ray, Leicester LE1
3TP.
Tel: (0533) 20864. Telex: 34658

Murphy Chemical Ltd.
Latchmore Court, Brand Street, Hitchin,
Hertfordshire SG5 1HZ.
Tel: (0462) 57272. Telex: 82414

Norman and Spicer (Agrochemicals) Ltd.
51 High Street, Astcote, Towcester,
Northamptonshire.
Tel: (0327) 830236

Pedley and Farr Ltd.
The Mill, Stone Road, Eccleshall, Stafford.
Tel: (0785) 850631

Protech Formulations Ltd.
Larsen Road, M62 Trading Estate, Goole,
North Humberside DN14 6XF.
Tel: (0405) 61746

Rohm and Haas (UK) Ltd.
Agrochemical Department, Lenning House,
2 Masons Avenue, Croydon, Surrey CR9 3NB.
Tel: (01) 686 8844

Quality products from **INTERLATES**

Librel

A range of chelated trace elements in liquid and powder forms.

Libreleaf

A lower-priced range of natural chelates in liquid form made from plant lignins. Specifically for foliar feeding.

LibreBor

An organic boron complex in liquid form, for foliar feeding. Also contains amine nitrogen.

Libspray

Foliar feeds, in powder and liquid forms, containing N, P and K, and chelated magnesium, iron, manganese, copper and zinc. Plus boron and molybdenum.

Libsorb

Non-ionic wetting and spreading agent.

Soiltex L1

A soil conditioner, for the retention of crumb structure and tilth, and the prevention of capping.

BanDrift

A spray drift control agent for use in both ground and aerial spraying.

Free literature describing each of these products is available from Interlates at the address shown below.



Interlates Limited

**Gladden Place, Skelmersdale,
Lancs WN8 9SX, England**

Telephone Skelmersdale (0695) 33535
Telex 627672. Cables Librel Skelmersdale.
**Interlates Limited is a member of the
Allied Colloids Group.**

Sandoz Products Ltd

Agrochemicals, Norwich Union House,
16-18 Princes Street, Ipswich, Suffolk
IP1 1QT.

Sands Agricultural Services (Norfolk) Ltd.

Ingham, Norwich, Norfolk NR12 9TA.

Tel: (0692) 80781

Shell Chemicals UK Ltd. (Agricultural
Division)

39/41 St. Mary's Street, Ely, Cambridgeshire
CB7 4HG.

Tel: (0353) 3671. Telex: 817415

Sprayrite Chemicals and G.T. Tyres

1 Moss Street, Keith,

Banffshire, Scotland.

Tel: (05422) 2241/2401

Stanhope Chemical Products Ltd.

96 Bridge Road East, Welwyn Garden City,
Hertfordshire AL7 1JW.

Tel: (07073) 24379. Telex: 267418

Stauffer Chemical Ltd.

201 Harpur Centre, Bedford MK40 1PH.

Tel: (0234) 40611. Telex: 826629

Stokes Bomford Agriculture

Spring Hill, Lower Moor, Pershore,
Worcestershire.

Tel: (0386) 860555

Union Carbide (UK) Ltd.

Agricultural Chemicals Division, Springfield
House, Kings Road, Harrogate,
Yorkshire HG1 5JJ.

Tel: (0423) 509731. Telex: 57486

Uniroyal Ltd.

Brooklands Farm, Cheltenham Road,
Evesham, Worcestershire WR11 6LW.

Tel: (0386) 47251. Telex: 339350

Wheatley Chemical Co. Ltd.,

Lanthwaite Grange Industrial Estate, South
Kirkby, Pontefract, West Yorkshire WF9 3AP.

Tel: (0977) 47578

BEAT DISEASE & Sprouting



FOR CONTRACT TREATMENT TO CONTROL SPROUTING
AND DISEASE IN STORED POTATOES BY THERMAL
FOGGING

Call:

STORED CROP CONSERVATION

POTTERHANWORTH ROAD, HEIGHINGTON, LINCOLN

Telephone: (0522) 792349

Dexstar Looking **Chemicals Ltd.** after you

The most comprehensive range of products in the market at competitive prices.

- | | |
|-----------------------------|--|
| 1. Mastitis Control | 3. Disinfectants and powder washer chemicals |
| 2. Pipe Cleaner/Sterilizers | 4. Pig and Poultry hygiene products |

Caledonian Works, Lockerbie, Dumfriesshire D611 2AD
Tel: Lockerbie (05762) 2156

Ireson Works, Bennet's Field Industrial Estate, Wincanton,
Somerset BA9 9JU. **Tel: Wincanton (0963) 32495 & 32161**

Shepherds Grove Industrial Estate West, Stanton, Bury St. Edmunds,
Suffolk IP31 2AR **Tel: Stanton (0359) 51010**

SHUKERS

LAND ROVER — RANGE ROVER DEALERS

FOR SOUTH SHROPSHIRE, NORTH HEREFORDSHIRE

Telephone: LUDLOW 3741

croall bryson & CO. LTD

**FOR
LAND ROVER AND RANGE ROVER
IN THE SCOTTISH BORDERS**

Roxburghshire Works, Kelso TD5 7HZ

Telephone: (0573) 24345

The Land Rover One Ten

Blistering deserts, tropical rain forests, blizzard-swept mountains, quarries, mines and main roads have all played their part in creating the new Land Rover One Ten. Equally at home cruising along a British motorway or pioneering 'impossible' routes in remote corners of the world, it is the latest addition to a range of 4 x 4 'workhorses' whose international reputation has no equal.

EVOLUTION NOT REVOLUTION

Launched to supplement the Series III models, the One Ten is a new Land Rover in its own right. But it is also the product of many lessons learned over many years—a process of evolution rather than revolution. In simple terms, the One Ten brings together the best of Land Rover and Range Rover technology. It loses nothing in the way of strength, longevity and versatility, but sets new class standards for ride, handling and overall refinement.

The One Ten is based on an immensely robust, robot-welded box-section steel chassis. Although derived in concept from the Range Rovers frame, it is even stronger to cope with the One Ten's payload potential: 'The Range Rover was an excellent starting point, but the One Ten's chassis is unique,' said Mike Broadhead, Land Rover's Engineering Director.

Swelling to a centre-section depth of over 7.5 inches (190 mm), the frame is designed to withstand the most demanding off-road conditions. It provides an extremely solid and adaptable platform for Land Rover's own bodies and for a wide range of specialised coachwork and equipment.

Careful protection for the 17.5 gallon fuel tank is typical of the overall chassis design. So is the thoughtful provision of a cross-member, bolted rather than welded, which facilitates work on the engine, gearbox and transfer box.

Land Rover's unrivalled know-how accounts for such small but highly significant details as the way in which the wiring harness to the rear of the One Ten is fed carefully through the chassis frame's box sections; 'Lashing it to the outside would save time—but it would also

make it more vulnerable,' said Mike Broadhead. 'We are constantly reminding ourselves that many of our vehicles operate in conditions where even quite simple failures can be literally fatal.'

Four new jacking points—one at each end of the chassis's longitudinal members—replace under-axle jacking and, used in conjunction with a new pillar-type jack, give easier access and improved stability when wheels have to be changed. The High Capacity Pick-up retains the traditional Land Rover bottle jack for use under the axles.

COIL SPRING COMFORT

Coil-spring suspension accounts for the One Ten's superbly smooth ride and astonishing ability to traverse the most demanding terrain. Again derived from the Range Rover, but strengthened to cater for the One Ten's load-carrying capacity, it provides 7 inches (180 mm) of wheel travel at the front and 8.25 inches (210 mm) at the rear.

When compared with the Series III Land Rover's leaf springs, the One Ten's coils provide 50 per cent more travel up front and 25 per cent more at the rear. Coils also eliminate the friction inherent in multi-leaf springs, thus improving ride quality.

Approach and departure angles of 50 degrees and 35 degrees respectively enable the One Ten to tackle very abrupt changes of gradient. This is achieved by mounting the rear axle close to the end of the chassis to minimise overhang.

A minimum ground clearance of 8.5 inches (216 mm) allows the One Ten to traverse the most demanding terrain.

Suspension movement at front and rear is controlled by long-stroke hydraulic dampers giving a high level of comfort and steering feel. In addition a Boge Hydromat ride-levelling unit is standard equipment on the County Station Wagon and optional on other versions of the One Ten. It comprises a gas-filled, oil-damped, self-energising strut which pumps itself up automatically to compensate for increased load.

The unit raises the rear of the vehicle, leaving the coil springs with their full vertical movement to absorb punishment.

Land Rover's own beam front axle is located by long, forged-steel radius arms with a Panhard rod providing lateral location.

At the rear, the Salisbury axle has tubular trailing links which, like the front radius arms, prevent excessive fore and aft movements while allowing plenty of vertical travel. Lateral movement is controlled by a centrally-mounted 'A' frame.

'All we've learned about Land Rover and Range Rover suspensions has been distilled and poured into the One Ten,' said Mike Broadhead. 'We have also worked closely with our suppliers to get the right mixture of tyres.'

The 5.50 x 16 pressed-steel wheels take a variety of dual-purpose, cross-country heavy-duty and sand tyres.

DISC BRAKES

The One Ten is the first production Land Rover

with disc brakes for the front wheels. Introduced to complement the newcomer's performance, the 11.8 inch (300 mm) discs operate in conjunction with 11 inch (280 mm) drums at the rear and a large diameter 10 inch (254 mm) transmission handbrake.

The servo-assisted system features a twin master cylinder with separate lines to the front and rear brakes. Any drop in pressure is detected by a sensor which illuminates a warning light on the instrument panel, while braking effort is maintained in the unaffected circuit.

The discs improve retardation, resist fade and dry out much quicker than drums—an important point in view of the Land Rover's ability to negotiate deep water. Relative ease of maintenance and replacement is another advantage which reduces operating costs. Rear brake performance is enhanced by improved drum sealing.

LIGHT, PRECISE STEERING

A redesigned linkage gives the One Ten the lightest and most precise manual steering ever fitted to a Land Rover. Its quality is enhanced



WHEN YOU ARE THINKING OF A NEW FOUR-WHEEL
DRIVE VEHICLE, THERE IS ONE NAME THAT STANDS
FOR RELIABILITY, PERFORMANCE AND VALUE FOR
MONEY.

meirion motors

PARK AVENUE, ABERYSTWYTH

0970-4841

ABERYSTWYTH ROAD, CARDIGAN

0239-612365

POOL ROAD, NEWTOWN

0686-25942

HEWITTS

HEWITTS GARAGES LTD

**COME AND VISIT YOUR
LAND ROVER SPECIALIST**

Most models in stock or for early delivery

- Top class servicing and repairs
- Fast delivery spares service

HEWITTS GARAGES LTD
Stafford Street
Wolverhampton Tel 29122



Quality New and Used Cars

Ideal for farm use

**Main dealers for Sherpa vans, Landrovers,
the Austin Rover range and Jaguar**

AUSTIN ROVER



OPENING HOURS

MON, WED, FRI	9.00am—8.00pm
TUE, THUR, SAT	9.00am—5.30pm
SUN	1.30pm—5.30pm

MACRAE & DICK



STATION ROAD, ELGIN (0343) 48444

Telephone sales, service, spares and self drive hire
(including Land Rovers) Tel: 0343 48444



**A VERY SPECIAL
PLACE TO DRIVE
LAND ROVER'S NEW
LAND ROVER.**

**DUTTON-
FORSHAW**
The Specialists



As a Land Rover Centre, we'll make a specially good job of demonstrating the One Ten to you—our knowledge and experience of the Land Rover and Range Rover marques is second to none.

Put us to the test right away.

DUTTON-FORSHAW KENT

**Bircholt Road, Parkwood
Maidstone 65461**

**Medway Street, Chatham
Medway 41122**

**Cannon Lane, Tonbridge
Tonbridge 364444**

Land Rover Range Rover



...Built to take it

CHESTER ROAD, ELLESMERE PORT

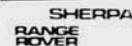
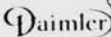
Tel-051-355 1821-051-355 3268

Offley No1
DEALER
AUSTIN ROVER

OPEN 7 DAYS BROTHERS

SWAN GARAGE BUNBURY
TEL 260230

TOTTEYS GARAGE WEST KIRBY
TEL 051 625 6161



by a smart new steering wheel in black polypropylene. The turning circle is reduced from 47 feet (14.3 m) on the 109" Series III to 42 feet (12.8 m)—a turning radius of 21 feet (6.4 m)—making the One Ten easier to manoeuvre, either when parking or in tight off-road conditions. The improvement also stems from a decision to make the track just over 11 per cent wider than the Series III's, thereby increasing lock angle.

The steering is a recirculating ball system geared for 4.37 turns from lock to lock. It incorporates a damper, mounted between the chassis and drag link, to absorb serious wheel shocks.

The One Ten breaks new ground by being the first Land Rover ever to be offered with power-assisted steering as a factory-fitted option. It is the system used so successfully on the Range Rover, and reduces the lock-to-lock turns to 3.0.

MORE POWER AND REFINEMENT

Land Rovers have been marketed with a choice of engines ever since 1957, when the company's first diesel unit became available. The One Ten's top power unit is the 3528cc V8, a remarkably light all-aluminium engine noted for its smoothness and durability. Versions of

the same engine are used in the Range Rover and Rover SD1 family of executive saloons.

Equipped with twin Zenith Stromberg CD carburettors, the overhead-valve V8 develops 114 bhp (85 kW) at 4000 rpm and 185 lbf.ft (251 Nm) of torque at 2500 rpm when installed in the One Ten.

Power is 25 per cent up on the Series III Land Rover's V8 while torque is increased by more than 10 per cent. The compression ratio is 8.13 : 1 and the engine is designed to run on low octane petrol.

A revised camshaft and a twin-choke 32/34 DMTL Weber carburettor combine with redesigned inlet and exhaust manifolds to give Land Rover's 2286cc four-cylinder five-bearing petrol engine additional muscle. Power is raised from 70 bhp (52 kW) to 74 bhp (55 kW) at 4000 rpm, while maximum torque moves up from 117 lbf.ft (159 Nm) to 120 lbf.ft (163 Nm) at 2000 rpm. Modifications provide better low-speed torque—a valuable asset in tough off-road conditions.

The four-cylinder engine's diesel counterpart,



- * Super deals on Land Rover, Range Rover, and new 110.
- * Extra special trade-in prices on imported vehicles.
- * Complete service and parts facilities.

Lex Mead

SOUTH WALES LEADING



AND

RANGE ROVER

CENTRE

Contact: Terry Houghton
Tel: (0633) 858451

**SHAFTESBURY ST.,
NEWPORT**

HATTONS (ST. HELENS) LIMITED

FOR ALL
THE
VERY BEST



IN
NEW & USED
LANDROVER
&
RANGE ROVER

PHONE US FIRST BECAUSE TIME IS MONEY

0744 34441



Austin Morris

Jaguar

Range

Triumph

Sherpa

Daimler

Landover

M.G.

Range Rover



449 Prescott Road, St Helens, Merseyside



RANGE ROVER

Daimler
SPECIALIST

JAGUAR
SPECIALIST

Hard
Top



'County'
Station
Wagon



WHEN YOU NEED A 4WD WORKHORSE, A LUXURY GO-ANYWHERE VEHICLE OR A LUXURY EXECUTIVE CAR, DRIVE LAND ROVER, JAGUAR. 'WHEN ONLY THE BEST IS GOOD ENOUGH!'



KENNINGS

**PADHOLME RD
PETERBOROUGH TEL. 61201**



Early Land Rover One Ten prototype undergoing testing at Eastnor Castle.

with CAV Pintaux injectors and a 23 : 1 compression ratio, has a fine reputation for durability and economy. The inlet manifold has been modified and a solenoid-operated cut-out on the injector pump now provides the convenience of a car-type key switch-off.

Particularly popular with operators who make use of the power take-off points that have always been standard Land Rover features—the One Ten has two of them—the diesel delivers 60 bhp (45 kW) at 4000 rpm and 103 lbf.ft (140 Nm) of torque at 1800 rpm.

NEW GEARBOX AND TRANSFER BOX

The power and torque outputs of the four-cylinder engines are enhanced by the adoption of a strengthened version of the five-speed LT77 gearbox. Originally developed for the SD1 Rover car, and later extended to the Jaguar range, it provides a fast, precise, car-smooth change. Matched with the LT230R transfer box which made its debut in the automatic Range Rover, the LT77 provides ten forward and two reverse ratios. The 'extra' gears have enabled the transmission to be 'tuned' to make the most of the One Ten's potential both on and off the road.

For example, the lowest of the ten forward speeds enables the new Land Rover to climb 40 degree slopes readily. At the other end of the scale, fourth in high range is pitched slightly lower than top in the Series III gearbox to provide punch and flexibility. High-range fifth, with its 0.83 : 1 ratio, makes the One Ten a relaxed open-road cruiser.

The powerful, high-torque V8 engine is linked to the rugged four-speed LT95 integral gearbox and transfer box used on the Range Rover and Series III V8 Land Rover. Shifting the transfer box between high and low ranges gives eight forward and two reverse ratios.

The LT95 and LT77/LT230R systems both have lockable centre differentials to provide maximum traction in demanding conditions. In both cases the centre differential lock can be engaged at any speed, in either ratio.

PERMANENT FOUR-WHEEL DRIVE

The One Ten's specification includes permanent four-wheel drive with front and rear axle differentials in addition to the lockable centre unit. The inherent advantages of such a system have been appreciated by Range Rover users

ever since the model's launch in 1970. Valuable for off-road applications, it also provides a considerable on-road safety bonus, particularly on treacherous surfaces. Road-holding, acceleration and braking all benefit.

In addition, a permanent 4 x 4 system eliminates the risk of drivers suddenly encountering tricky on-road or off-road conditions with only rear-wheel drive engaged.

The option of selectable two/four-wheel drive is available on the five-speed 4-cylinder models, in conjunction with free-wheeling hubs for the front wheels.

'TOP TWENTY' TIPS FOR OFF-ROAD DRIVING

Land Rover's team of professional drivers have tested One Ten in the widest possible range of conditions, from snow and ice to desert sand and tropical swamps. They have an unrivalled knowledge of off-road driving techniques. Here are a few tips from Roger Crathorne, Land Rover's Demonstrations Manager.

- ★ Get to know your vehicle and its performance potential. Squeeze the accelerator gently to avoid wheelspin.
- ★ Survey difficult terrain on foot to reduce the risk of encountering an unexpected hazard.
- ★ Select low range and a suitable gear before tackling a difficult section. Avoid the temptation to 'play safe' by selecting a gear lower than the terrain warrants.
- ★ Do not ride the clutch. You can lose control by accidentally depressing it if the vehicle hits a bump.
- ★ Keep use of brakes to an absolute minimum to avoid wheels locking on wet, muddy or loose surfaces. Tackle steep slopes in the low range's first gear, then rely on engine braking.
- ★ Reduced tyre pressures improve traction in really soft conditions—but consider the subsequent loss of ground clearance.
- ★ Follow the fall line to climb or descend steep slopes. Travelling diagonally may result in a broadside slide.
- ★ If you stall while climbing a steep hill, hold the vehicle on the brakes and engage low-range's reverse gear. Remove feet from clutch and brake pedals, start engine in gear and use engine as brake.
- ★ Try to avoid exceptionally deep ruts and other obstacles likely to cause ground-clearance problems.
- ★ Do not over steer along rutted tracks. Front wheels pointing in the wrong direction can suddenly regain traction with potentially serious consequences.
- ★ Always tackle a ridge at a right-angle to the crest so that both front and both rear wheels cross together.
- ★ Cross ditches at an angle with three wheels assisting the fourth's passage.
- ★ Check terrain very carefully for sudden depressions and other hazards if a slope has to be traversed. Load cargo as low as possible. Place passengers on the uphill side of the vehicle.
- ★ Make slow, steady progress through deep water to create a bow wave 'cavity' in the engine bay and minimise risk of water drowning the engine. Check brakes after immersion.
- ★ A buried spare wheel makes a good anchor if you get stuck in sand and there is nothing else for a winch to pull on.
- ★ Do not wrap your thumbs round the steering wheel. They can be broken if the steering kicks back on really rough ground.
- ★ Avoid prolonged wheelspin if the vehicle comes to a halt.
- ★ Cleaning clogged tyre treads improves traction—so do brushwood, sacking and the like when placed in front of the wheels.
- ★ If the vehicle has dug itself in, jack it up and build up the ground under the wheels to obtain clearance.
- ★ Try to keep all four wheels on the ground to maintain traction. Hard-charging tactics delight photographers, but taking it gently often proves fastest overall.

Weighing on the farm

by Hampshire Arable Systems Ltd.

Weighing equipment has traditionally been one of the lower priorities on a farmers shopping list. The high cost of weighbridges of the balance type together with pit excavation have tended to put farmers off. Today's technology of the electronic load cell and micro-circuitry has given the farmer a choice of weighing equipment which is both cheap and accurate.

The livestock farmer has for some time known his production figures relative to input costs, and accepts measurement by weight, and performance of individual animals.

The arable farmer is lost when it comes to measurement of individual fields, since the product of each field is bulked, and when a

trailer load is tipped into the intake pit, it loses its identity and becomes part of the whole farm output. Now with the high cost of cereal growing the need to record each field performance has become more important. This performance must be put against the inputs for each field, so an objective appraisal can be made of the techniques employed.

Not only is there a need to weigh into the farm, but there is great justification for weighing loads leaving the farm.

Farmers have always been "weak sellers". All the time the farmer is in the hands of a third party, for both sales of produce and deliveries on to the farm, he is dependant on other people weighing. How often have you



Weighwrite ADS Dynamic Axle Weigher.



WEIGHWRITE ADS IN MOTION AXLE WEIGHER

WEIGHWRITE VEHICLE WEIGHING SYSTEMS AVAILABLE FOR

- * Recording Crop Yield
- * Grain Store Control
- * Checkweighing Incoming and Outgoing Loads

WE HAVE A FULL RANGE OF EQUIPMENT AVAILABLE FROM LOW-COST DO-IT-YOURSELF PLATFORMS TO FULL-SIZE TRADE WEIGHBRIDGES.

FOR FURTHER INFORMATION AND ADVICE CONTACT:-



WEIGHWRITE

49 West Street Farnham Surrey GU9 7DX Tel: Farnham (0252) 711011



WAYMASTER

Manufacturers of Agricultural and Industrial
weighing equipment.

A wide range of specialised spring balances and
livestock weighers for farms, markets,
warehouses etc.

Precision Weighers
176 Caversham Road, Reading Tel: Reading 590053
Telex No.: 847038

followed a grain trailer down the road dribbling grain, or wondered whether the correct amount of feed has been delivered. It is not a case of being distrustful, but of being more secure.

When you come to try and justify the cost there are many opportunities for weighing — grass silage, potatoes, fertilizer, feed stuffs, fuel, just to mention a few. The capital investment now begins to look more acceptable, set against the total cost of purchased materials in any one year.

With these thoughts in mind we were asked by our clients to investigate the weighing machine market in 1980. Many lines of enquiry were followed up, but eventually the trail led to the equipment often seen in laybys on the main highways being used by local authorities in conjunction with the Police to check-weigh and if necessary prosecute overloaded vehicles. Weighwrite Ltd. of Farnham, Surrey were well established in the industrial market with their Dyna-

mic Axle Weigher which, using load cell technology to provide axle weights of vehicles, appreciated that there was an agricultural market for weighing machines. Since when Weighwrite has entered the market with enthusiasm and are now providing the farmer with equipment ranging from "in-motion" axle weighers with printout and computer links to a D.I.Y. static weighbridge for smaller farms. Latest devices are pallet weighers, cattle weighers and bin weighers. Think how easy it would be to adapt a grain or feed bin and put load cells under the legs!

Currently the load cell principle is on offer for measuring the flow of the combine auger, grain store elevators, through to the new large bulk lorries. The cost consideration appears to range from £1,000 to £15,000, but flexibility appears to only come at the upper end of the market, with machines that can weigh both in and out of the farm. Surely this is the ideal requirement.

Authoritative, unbiased well written articles of interest to members are welcomed by the C.M.A. for inclusion in future editions of this Year Book. All those with specialist knowledge or a particular field of interest are invited to submit articles to the publishers.

Millbank Publications Ltd.
25 Catherine Street
LONDON
WC2B 5JW

Attn: Mr. Tony Hislop

or telephone 01-836 1823 for further information.

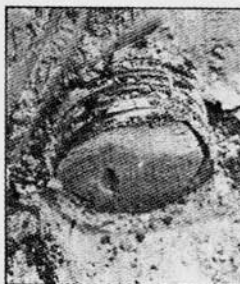
BIG 'O' FILTERS

The world's finest drainage filter...

...Your filter has to be the best for you to have the maximum benefit from your investment.

Use the tried and tested filter.....that works.....and works.....and works!!

Without the benefit of filter, drainage systems soon plug in areas with fine soils



**OVER FIFTY MILLION METRES
ALREADY INSTALLED!!**

THE BIG 'O' FILTERS U.K. LTD.

Birchfield Road, Redditch, Worcs. B97 4LX.

Telephone (0527) 402646

DRAINAGE PROBLEMS !

CONSULT

LEICESTERSHIRE DRAINAGE CO. LTD.

23 Westerby Lane, Smeeton Westerby, Leics.

Telephone: Market Harborough 67684

DRAINAGE CARRIED OUT USING MODERN TRENCHLESS MACHINES, FITTED WITH LASER BEAMS FOR COMPLETE ACCURACY OF GRADE.

OUR SERVICE INCLUDES EVERYTHING FROM SCHEME DESIGN TO FINAL SURVEY. WORKMANSHIP AND MATERIALS GUARANTEED FOR MINIMUM OF 10 YEARS. ALL SCHEMES COMPLY WITH MINISTRY SPECIFICATIONS.

FARM WATER SUPPLIES AND DITCHING — MOLE DRAINAGE AND SUB SOILING.

Irrigation

A recent survey by the Ministry of Agriculture has revealed that more than 247,000 acres of farmland in England and Wales are irrigated. This survey was based on voluntary figures supplied by landowners who have irrigated their crops during the past two years and so the actual 'real' area of irrigated farmland could be much greater.

The survey went on to show that, in 1982, 248,300 acres of crops were irrigated and the total volume of water used was 55 million m.

Of the crops that were irrigated, maincrop potatoes received the most. 54,700 acres of maincrop potatoes were covered with 15,280 million cu m. of water. Grass and sugar beet came about second equal with 39,000 acres covered respectively.

The type of irrigation used depends largely on the geographical location of the farm

concerned. Most of the water used for irrigation comes from rivers, streams or other types of water course. When this is not practicable, then deep boreholes are the next most commonplace means of providing water for crop irrigation.

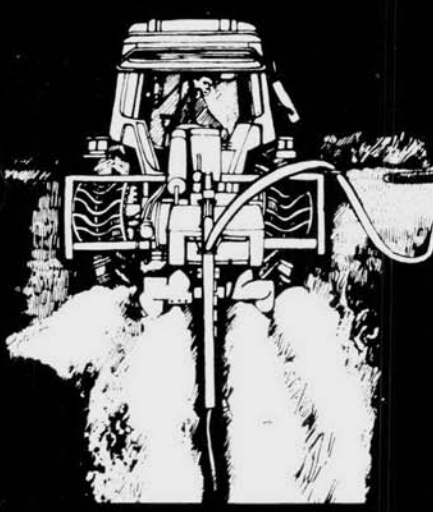
Other types of irrigation include clay or gravel working, wells, springs and public supply.

Many farms have water storage facilities and the Ministry of Agriculture Survey revealed that about half the water used during the two years covered came from these on-farm facilities.

Self propelled irrigators were shown to be the most popular types of equipment used, with rain guns proving to be approximately seven times more popular than boom-type equipment.

IMPROVE YOUR DRAINAGE

with an AFT 65 tractor mounted trencher



Turns your tractor into a trencher in ½ hour. Allows you to drain when conditions are right and when it suits you. Saves up to 50% of costs and can trench up to 1000 yards/day in average conditions. Grading device and pipe layers available. Write or telephone for details or demonstration etc. direct to the manufacturers.

**AF Trenchers Ltd
Gosbecks Road
Colchester CO2 9JS
Tel. 0206 44411**

FOR ALL YOUR LAND DRAINAGE PROBLEMS

Contact

NORMAN GRIFFITHS & CO.

19 MAIN STREET, GREAT GLEN,
LEICESTERSHIRE LE8 0GH

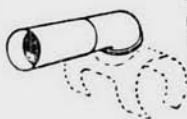
Tel.: Great Glen 2419 Leicester 402427

ALL WORK TO MINISTRY SPECIFICATION
ALSO HEDGE REMOVAL AND DITCHING, ETC.

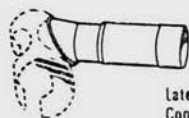


**ALL TYPES
ALL SIZES**

FOR LAND DRAINAGE PIPES AND PRODUCTS



Overhead
Top
Connecting
Pipe



Lateral
Connecting
Pipe

Quick-Fix Plasfit drainage junctions.

Over 800,000 acres were drained using Plasfit in 1981/82 in UK, France, Germany and Holland.

Full range of Associated Products for Agriculture.

For supplies, prices and service contact:- Douglas Ryan

**Ryan Pipe Ltd.,
Bardsley Road,
Corby,
Northants.**

**Tel. Day: 05363 63146/60971
Eve: 0536 710518**

Other types of irrigation equipment include sprinklers, spray lines, and stationary rain-guns.

The survey showed that approximately 400 holdings used sprinklers. These types of irrigation equipment are now made with up to five nozzles providing a variety of water velocities and sprinkler patterns. Many sprinkler systems come with a standpipe hydrant.

Another popular piece of irrigation equipment is the 'drum' irrigator. These come in wide variety of models, some with 360° turntables, and cover a large operating area, are quick

to install, are very flexible and easily adapted to individual requirements.

Stationary rain-guns are useful for smaller areas of crop cultivation, but can be easily moved depending on the water source.

Drainage methods again depend on the individual requirements of the holding, taking into account factors such as size of area concerned, geographical location etc. For the larger farm holding, where trenches and pipe drainage may be involved, it will probably be necessary to call in an outside contractor, using plant hire.

Southwest Drainage Specialists

- ★ Complete service from Design to Grant Claim.
- ★ Only latest and best machinery used by experienced operators.
- ★ Laser Grading on Drainage Machines.
- ★ Land Drainage with Plastic or Clay Pipes.
- ★ Moling, Subsoiling, Ditching, Site Clearance.

— QUALITY — EFFICIENCY — SERVICE —

From

D. S. & E. M. RIDGE LTD.

HAY LODGE, BROADCLYST, EXETER

Telephone: (0392) 61291

Faster, more competitive LAND DRAINAGE...

John Salmon Land Drainage
*takes delivery of a new
generation in trenching
machines to bring farmers
a new level of service and
economy...*

A full service — using latest machinery
and laser techniques — in Land
Drainage, both plastic pipes and
traditional clay tiles at competitive
rates. Also Ditching, Earth Moving,
Mole Draining and Heavy Cultivating
service... done by experienced
operators with expert back-up teams.
Free estimates and Grant
Claiming Facilities.



**John
Salmon**
Land Drainage Ltd
MARTELS, DUNMOW
ESSEX
TEL: GT. DUNMOW (0371) 2108/9

The one sure way to be sure



tamperproof

Ketchum EAR TAGS

MINISTRY APPROVED—

The leading, largest selling cattle EAR TAG.
Unsurpassed for simple, foolproof coding security.
Also: Ear tags for SHEEP, PIGS and other animals,
together with pig shoulder tattoos and poultry
identifications.

Leaflets available.

KETCHUM MANUFACTURING CO., TADWORTH, SURREY. Tel: 2218/9



Citizens Band Radio on the Farm

by James M. Bryant, **MIERE**
President, Citizens' Band Association

INTRODUCTION

With the legalisation of Citizens' Band Radio, or CB, late in 1981 a very powerful tool became available to the British public. As usual the mass media misunderstood what was happening and played up its more spectacular manifestations and most mindless uses at the expense of the reality. This reality is at the same time both more mundane and infinitely more exciting. CB, for the first time in Britain, allows the general public access to modern communications technology at low cost and without the possibility of official interference. It means that any profession or pastime which is practiced out of doors can make use of short-range two-way radio.

In this article I intend to describe Citizens' Band Radio as a service, the equipment that is available, and how it is used to best advantage. Its use on farms differs from its use on building sites, factories, racecourses or university campuses only in the messages passed — not in the techniques used or the time and money saved.

DESCRIPTION

Citizens' Band Radio, or CB, is an inexpensive short-range two-way non-private radio service which is available to anyone who buys the equipment and a licence.

The most important thing to realise about CB is that it is two-way. Two people who have CB radios can talk to each other, if they are in range, without any more formality than in an ordinary face-to-face conversation. There is no need to use expressions such as "roger", "over" or any of the fantastic American CB slang which was so enthusiastically reported by the media — just talk and reply. It is, perhaps, worth noting that it is not possible to interrupt — while someone is transmitting he cannot receive as well

and listeners must wait for their own turn. Messages on CB may be as simple as "Come in for lunch" or as complex as a half-hour discussion, between several people, of the best way to get a crashed vehicle out of a ditch. But the essential point is that it is two-way — you can answer and be answered.

The next point is that CB is short-range. With legal equipment the range can vary from a few hundred yards to ten miles (depending on the exact equipment and the conditions under which it is used). CB operators can and do talk to other CB users all over the World but such conversations are illegal (and often involve illegal equipment — such as high-power amplifiers or "burners") and frequently interfere with short-range uses of CB. It is not generally possible to talk between the two ranges of under ten miles and over 1000 miles — this is the result of the technical properties of radio waves and is not worth explaining in detail. The section of the article dealing with equipment will describe how to achieve the required range within the limits of the law.

CB is inexpensive, too. While Post Office radio telephones cost over £2,000 (and a fat quarterly rental charge as well) and private mobile radio sets (PMR or "taxiphone") cost over £350, the cheapest CB radio costs under £15. This is a single-channel battery portable and has a range of only a few hundred yards but a full-powered mobile CB costs only £35 to £65 (more if you want bells and whistles) and the best base station is little more than £150. Again, there are more details in the section dealing with equipment.

Apart from the fact that it is a radio service, and does not need telephone wires, there is only one other important feature of CB —

it is not private. There are 40 CB channels at 27MHz and every CB user in Britain uses them. This means two things — you may hear other people when you do not want to, and other people can, and almost certainly will, hear your conversations. An accessory called a selective call unit allows you to ignore any calls which are not addressed to you but there is no equipment which can prevent other CB users overhearing you — so do not use CB to discuss any matters which you are unwilling to have overheard. If CB were a long-range service this pressure (40 channels for over a million users) would be intolerable but since the maximum range is rarely over 10 miles (and is often much less) there is rarely a problem in finding a free channel in areas outside large cities and away from busy motorways (which are full of truckers and other drivers using CB).

EQUIPMENT

The UK has two legal CB services — 27 MHz and 934 MHz FM — and an illegal 27 MHz AM and SSB one. The UHF (934 MHz) service has great potential but is at present very expensive and little used, and the penalties for using the illegal service have recently been increased to over £1,000 for a first offence. This article will consider only the legal 27 MHz FM service.

Very little equipment is needed to use CB. All CB radios are "transceivers", which is to say that they include a transmitter and a receiver in a single package, and come equipped with microphones (which are built into hand portable sets but are connected by curly-cords to mobile and base radios). All that is needed in addition to the radio itself (often referred to as the "rig" by CB users) is an antenna or aerial and a source of power.

Hand-portable CB rigs come in two types — cheap 1 or 2 channel radios and more expensive, and higher powered, 40 channel ones. The cheap ones can be as little as £10 each and are very useful for communication over distances of up to half a mile. They will receive signals from high powered transmitters further away than this, but cannot reply. If you buy several of this type make sure that they are all on the same channel or

channels, and not on channels 9, 14 or 19 (which are reserved for special purposes). The high-powered 40 channel hand portables are bigger and heavier but have performance almost equal to mobile or base rigs (the antenna is slightly less efficient).

Mobile CB rigs are the ones most people mean by "CB". They are designed for use in a motor vehicle and are much the same size and shape as a car radio.

Base or "Base-Station" rigs are intended for use indoors and tend to be larger and more expensive and in flashy cases. Since the performance of a CB is specified by law there is almost no difference in performance between a good mobile, a good base-station and a good high-power hand portable (except possibly audio fidelity due to loud-speaker size).

Hand portable rigs use batteries for power — the smaller ones use PP3s and the larger ones use eight or ten HP7 or HP11 cells. Where the radios are in regular day by day use they should not be powered by disposable batteries but by rechargeable ones — each rig should have two sets of batteries, one of which is charged while the other is being used. Although nicad rechargeable cells are quite expensive the saving on dry cells, even over a few weeks, is considerable.

Mobile CB radios (the commonest sort) are designed to run from a car battery and are connected just like any other car radio, while base stations are powered from the mains like any other domestic radio or television. Base stations, while attractively packaged, tend to be much more expensive than mobile CB sets and many people use mobile sets, together with an inexpensive power supply, instead of a base station — there is no difference at all in performance. If you do this you should ensure that the power supply unit (PSU) is suitable for CB use and that the set-up is electrically safe. Use of a battery charger as a PSU for a CB may destroy both the charger and the rig.

Hand portable CB rigs have built-in antennas — either telescopic ones or short-

er, fatter, flexible ones called helicals or "rubber ducks". Rubber ducks are more convenient but slightly less efficient. If a telescopic antenna is fitted it must be fully extended during transmission but need not be for reception.

Mobile and base-station radios are not fitted with antennas but must be connected to an external antenna which has made for CB use — random lengths of wire will not do. There are many different types of antenna and their connection requires some care — it is best to seek advice from a CB shop or from a good book (such as "CB the FM Way" by Keith Townsend). The higher the antenna the better range it is possible to obtain from your CB but, by law, if it is over 7 metres from the ground the power of the transmitter must be reduced from 4 watts to not more than 0.4 watts (with most rigs this can be done by the flick of a switch).

A rig, a microphone, an antenna and power are all that you need to use CB (the person you want to talk to will need the same) but there are a two other accessories that are sometimes useful — an SWR meter and a selective call unit. The SWR meter is a small box with one or two meters on it which is used to ensure that your antenna is adjusted for best performance — it is not needed very often and if you can borrow one occasionally there is little point in spending even the £5 or so that they cost. The selective call unit allows you to hear only CBs that are also fitted with similar selective call units and are calling you — all other traffic is ignored (but THEY can hear YOU) — this is worthwhile in busy areas but not in open country.

CONTROLS

Most Citizens' Band Radios have five essential controls: the ON/OFF switch, the "push to talk" or PTT switch, the volume control, the squelch control, and the channel switch. In addition there are various others which are more or less useful and may or may not be present on any particular rig — we shall deal with them later.

The ON OFF switch and the volume control (which are often built into the same control)

do exactly the same as they do on any radio or TV — they turn the set on and off and make the volume of the sound that you hear greater or smaller.

The channel switch also corresponds to a control on a normal radio — the tuning control — but there is a difference. On most radios the tuning control is continuously variable — in a CB radio there are only 40 possible positions (the 40 channels) and so the tuning control is a 40 position switch which allows you to select which channel you will use. Associated with this switch there is usually a dial or display which tells you which channel you have chosen. Single channel radios do not have this control and cheap hand-portables may only have two or three channels available rather than 40, with a smaller switch.

The last two controls are new ones. The PTT switch is easily understood — it is the switch (usually on the microphone) which switches the rig from reception to transmission and back. When it is pushed the rig stops receiving and starts transmitting — when it is released the rig switches back to receive again.

The squelch control is a background noise limiter. When no station is received an FM radio generates a loud hiss — the squelch circuit turns off the loudspeaker at such times to prevent the listener from being disturbed. When the squelch circuit detects a transmission the loudspeaker is turned on again. The squelch control can also be used to cut out distant (and unwanted) stations by adjusting it so that the loudspeaker stays off when faraway stations are on the air but turns on when a local station transmits.

You may also find a number of other controls on a CB: tone controls, PA, DX, Hi-Lo Power, and many others. None is essential for the use of CB and their exact purpose may be read in the handbook. It is usually better to buy a CB radio with fewer controls as it is easier to operate and less expensive.

USE ON A FARM

Citizens' Band Radio is invaluable on farms.

It allows everyone to be in constant contact and thus saves time, money, temper, and, at times, lives. Just how it is used depends on a number of factors.

In rural areas, where there is not a lot of CB use, a farm can decide to use a particular channel and be fairly certain that it will largely be unused by anyone else — it is sensible to arrange with neighbours what channels will be used so that each farm has its own channel but everyone knows how to call the neighbours should this be necessary. In more urban, or densely populated areas this may not be possible and the channel used should be chosen from time to time from the channels which are available — if this is done it is ESSENTIAL to make sure that everyone knows what the new channel is before the move takes place otherwise the possibilities of confusion are enormous.

If the farmhouse (office, or wherever) is always occupied then a CB base station, with a high antenna, should be fitted there and the occupant should act as "control" for all the radios on the farm. If this is not possible

then one person should be nominated as "control" and direct any urgent radio traffic. If the farm is small low power hand portable rigs may be all that is needed. If it is large or hilly (hills block radio signals) everyone may need high power sets (mounted in cars or tractors) with a few additional hand portable ones carried when away from the vehicle (hand portables can often receive, even if they cannot transmit back). Some users arrange for transmissions to take place every hour on the hour, others prefer to have everyone listening all the time. The important thing is to have a flexible, uncomplicated arrangement which makes sure that messages get through with minimum delay and risk of being lost. It is not (too) important if you don't hear that lunch is ready — it is catastrophic if you don't hear that the barn is on fire!

The most important factor in the use of CB is experience. Don't expect to be perfect in a day or two but work on it over a period of months. Within a year you will wonder how you ever survived without it.

COMMUNICATIONS

Latest equipment supplied, demonstrated and fitted by our own personnel.

If you have equipment you cannot get serviced — contact us.



Telecom approved answering machines, cordless phones, telephones, etc.

Radio systems to suit your own requirements.

WRITE OR PHONE FOR ADVICE OR INFORMATION — ANYTIME

ACORN
* TELECOM SUPPLIERS *

185 LINCOLN ROAD
PETERBOROUGH

0733 62208

CMA Members

(by geographical areas)

England

AVON & SOMERSET

Austin A. J.
Baldwin I. S. MBIM
Bowditch S. H.
Bruce D. A.
Castle Stewart, Earl FBIM
Close E. MBIM
Coyle J. MBIM
Cooman N. J.
Ferguson R. N.
Harrison P. T.
Huntingdon F. P. H.
MacDonald C.
Miller T. L. E. MBIM
Mills M. J. B. FBIM
Oakley P. C.
Percival S. R. MBIM
Powell K. W. MBIM
Schofield J. A. MBIM
Thomas C. G. MBIM
White R. C.

BEDFORDSHIRE

Gibson R. A. FBIM
Griffiths T. MBIM
Gurney L. MBIM
Murphy Mrs P. M. MBIM
Jarvis P. S. MBIM
Slack A. M.
Weston R. N. MBIM
Yates E. W. MBIM

BERKSHIRE

Ashwell P. F. MBIM
Beacroft J. R. MBIM
Bedford J. P. FBIM
Boone G. J.
Buchanan I.
Carter V. R. B.
Clarke R. M. FBIM
Cockburn P. I. MBIM
Copas G. W.
Corbett D. J.
Cox B. E.
Crowhurst A. G.
Culley T. J. FBIM
Daka M. M.
Dann K. W. MBIM
Dugdale R. A. FBIM
Esslemont R. J. MBIM
Francis J. L. FBIM
Giles A. K.
Gladwell G. L.

Golightly A. J.
Greasby D. J. MBIM
Hart S. R.
Hicks T. P. MBIM
Hillson P. MBIM
James P. J. FBIM
Larkin G. R. FBIM
Osmond D. F.
Pearson A. T. MBIM
Pink C. FBIM
Rampton R. D. H. MBIM
Stainton P. J.
Stansfield J. M. MBIM
Stenning E. C. MBIM
Spring D. G. FBIM
Stevenson J.
Stokes R. A. FBIM
Tyler G. D. MBIM
Webber A.
Wharton I. G. MBIM

BUCKINGHAMSHIRE

Barker J.
Caswell P. M.
Evans J. M. A. FBIM
Graham A. R. W. MBIM
Hall N.
Hodges C. R. MBIM
Negus H. J. MBIM
Perkins R. MBIM
Potter B. L. MBIM
Stevens M. J. P. MBIM
Thomas M. A.
Timbury K. C. MBIM

CAMBRIDGESHIRE

Ball D. M. J. FBIM
Basham A. K. MBIM
Bird B. W. FBIM
Bolton D. J. H. MBIM
Brander N. G. E.
Brown S. J.
Burt A. T. MBIM
Butterworth K. FBIM
Cross T. FBIM
Churms S. N.
Curnow P. J. M. MBIM
Doel R. W.
Fairhead J. E.
Fenner R. J. MBIM
Gane A. J. FBIM
Giles R. D. P.
Graf Grote C. G. MBIM

Cambridgeshire continued

Green J. C. FBIM
 Haynes C. D. MBIM
 Hayton R. V. MBIM
 Hendy C. T.
 Hendy M. C. T.
 Hobbs I. A. MBIM
 Hughes M. J.
 Hyde-Smith Cmdr B. E. MBIM
 Ickeringill D. MBIM
 Jenkins J. G. CBIM
 Johnson P. R.
 Judd F. MBIM
 Keevil P. D. MBIM
 King W. A. MBIM
 Lancaster C. M. MBIM
 Langford E. B. FBIM
 Latham W. F. FBIM
 Lawford M. A. A. MBIM
 Leishman J. R.
 Madge W. E. R. MBIM
 Murphy M. C.
 Nix D. MBIM
 Palmer O. A. MBIM
 Pemberton A. F.
 Potter C. J.
 Potter R. M.
 Powell D. O. FBIM
 Reynolds J. K. FBIM
 Rozier J. C. FBIM
 Sandercock G. R. MBIM
 Somervell T. L.
 Stroude P. L.
 Sturgess I. M.
 Sturrock Dr F. G.
 Tarr C. C.
 Warner R. L. FBIM
 Wells S. D.
 Wood T. J.
 Wreford R.
 Yates A. S. MBIM
 Yates C. W. MBIM

CHESHIRE

Bown P.
 Boyle W. S. MBIM
 Brumby B. J.
 Cooper M. I. FBIM
 Deam J. H. MBIM
 Dutton H. FBIM
 Gentil A. E. MBIM
 Hitchen R. B.
 Pemberton G. E.
 Shelbourne R. L. MBIM
 Wassell T. R.

CLEVELAND

Atkinson J. A. MBIM
 Bates R. MBIM
 Blair P.
 Dale A. G.
 Daley J.

Cleveland continued

Free E. P. MBIM
 Grahamshaw G. G.
 Heddle S. G. MBIM
 Johnson I. S. MBIM
 Macrae D. J. R. MBIM
 Masterton W. G. MBIM
 Nelson J. K. MBIM
 Scaife M. R.
 Smith Ms E.
 Snowdon N. I. MBIM
 Wade A. MBIM

CORNWALL

Abbott P. D.
 Bowden P. C.
 Craig S. J.
 Ferrand M. G. FBIM
 Gray P. W.
 Horrocks A. P. MBIM
 Rowe G. R.
 Rowg F. A. MBIM
 Whitehead I.

CUMBRIA

Auld A. R.
 Hart G. N.
 Hector G. O. FBIM
 Inglewood Lord FBIM
 Norwood C.
 Washington Lt Col T. J. C. MBIM

DERBYSHIRE

Gray P. H. B. MBIM
 Hives Rt Hon Lord FBIM
 Land S. J. J. MBIM
 Slater A. MBIM
 Turner I.

DEVON

Ansell K. G. FBIM
 Atkinson J. M. MBIM
 Balkwill J. D.
 Blowey P. P.
 Botting J. M. FBIM
 Brazier C. C. FBIM
 Briant-Evans H. C. FBIM
 Browne I. R. P.
 Camm B. M. FBIM
 Cake A. L.
 Carter J. S.
 Chapman R. T. MBIM
 Davies G. W.
 Douglas A. V.
 Downes J. T. FBIM
 Ellis P. R. J. MBIM
 Ferguson R. M. FBIM
 Gallow J. D.
 Griffith-Jones M. T. L. MBIM
 Hailey S. P. MBIM
 Hawkins Sqn Ldr B. D. MBIM
 Hicks K. G.

Devon continued
 Hill S. M. MBIM
 Hough P.
 Iddesleigh Rt Hon Earl
 Jones P. M.
 Kent P. MBIM
 Morley Miss A. MBIM
 Peters C. W. MBIM
 Persey R. L. MBIM
 Powell W.
 Quicke J. G. FBIM
 Rounsfall T. M.
 Russell Miss S. J.
 Salkield A. M. MBIM
 Sampson R. H. FBIM
 Seddon Q.
 See Dr R. W.
 Smith A. B. MBIM
 Sobey E. J. MBIM
 Soffe R. J. MBIM
 Spence D. MBIM
 Staines P. F. MBIM
 Trotter R. MBIM
 Trump C. C. G.
 Trump J. M.
 Warren M. F. MBIM
 Watson J. R. MBIM
 Wright D. A. MBIM

DORSET

Aston B. T. FBIM
 Bareham T. J. MBIM
 Barker P. J. MBIM
 Boyt P. T. MBIM
 Bridges C. J. G.
 Bryant S.
 Burt E. F. H. MBIM
 Coombs R. M. MBIM
 Cradock D. N. FBIM
 Crane P. A. T. FBIM
 Crawford P. A. V.
 Crocker D. G. H.
 Cross H. B.
 Dampney T. D. FBIM
 Dowse C. T.
 Frybrough W. G. MBIM
 Dunk S. C. MBIM
 Gale M. E. MBIM
 Gates M. L. MBIM
 Glyn R. L. MBIM
 Gooch Miss B. J.
 Gulliford R. M.
 Hall R. R. MBIM
 Hann G. A. G.
 Hoey P. M.
 Jones D. S.
 Lawton W. N.
 Lewis A. G.
 Lewis M. H.
 Lewis P. R.
 Logan R. MBIM

Dorset continued

Medley C. A. B.
 McFarlane D. B.
 Mitchell C. J. W.
 Paul N. L.
 Rippon P. R.
 Stanley P. E.
 Shepherd J.
 Streatfield G. H. MBIM
 Taylor M. R. MBIM
 Tory M. A.
 Viney N.
 Webb P. J. FBIM

ESSEX

Crees E. J. FBIM
 Curtis P. J. MBIM
 Daldry J. M. MBIM
 Dodgson G. J. MBIM
 Fairhead R. W. T.
 Flack J. C. MBIM
 Fleming J. D. MBIM
 Gray T. D.
 Green C.
 Gummery K. J.
 Hawkes R. J.
 Hendrick A. E. MBIM
 Hingston C. J. FBIM
 Hutley P. J.
 Innes P. FBIM
 Lilley J. B. MBIM
 Longbottom G. A. FBIM
 Macdonald L. J. MBIM
 Mackie J. M. MBIM
 Manson J. C. FBIM
 Miller W. M.
 Muirhead W. J.
 Nott N. M. MBIM
 Orman Mrs B. W. MBIM
 Payne J. S. FBIM
 Reynolds G. MBIM
 Roberts J. D.
 Rook J. A. J. MBIM
 Simmonds F. FBIM
 Stephenson-Bell R. FBIM
 Thompson C. R. M.
 Turner J. M. MBIM
 Whiting P.
 Willy R. J. MBIM

GLOUCESTERSHIRE

Allen R. C. MBIM
 Beale R. E. MBIM
 Clarke M.
 Coleridge G. P. MBIM
 Davison M. J. FBIM
 Godwin R. A. MBIM
 Graham J.
 Hawkes-Reed A. J. MBIM
 Hitchman M. T.
 Jones R. N.
 Machin S. J. MBIM

Gloucestershire continued

Padfield G. K.
 Pearson T. D. G. MBIM
 Ross P. MBIM
 Rowe C. J.
 Rowles M. A. MBIM
 Stewart R.
 Taylor M. I. FBIM

HAMPSHIRE

Allison D. J.
 Arnison-Newgass M. MBIM
 Beresford-Stooke P. M. MBIM
 Botting J. M. FBIM
 Boyle M. P. R. FBIM
 Brigstocke T. D. A.
 Caws R. A. MBIM
 Crowley M. S. T.
 Dines R. D. MBIM
 Dolbear J. MBIM
 Eagar A. E.
 Empson Wing Cmdr H. G. MBIM
 Fairey J. N. F. FBIM
 Faragher T. W. MBIM
 Fielding D. F. MBIM
 Firmston T. J. MBIM
 Forster N. C. MBIM
 Fullman D. J. MBIM
 Gray A. MBIM
 Hallett G.
 Harbottle D. F. MBIM
 Herdman R. H. L.
 Illsley J. MBIM
 Leader R. W. MBIM
 Loveys Jervoise J. MBIM
 Nettle J. D.
 Nightingale M. A.
 Norman L. FBIM
 Oldroyd D. C. L.
 Parker J. P. MBIM
 Payne A. J. MBIM
 Race M. G. MBIM
 Rennie I. J. MBIM
 Sarsfield-Hall P. C. MBIM
 Sclater E.
 Sclater E. A. MBIM
 Smail J. A.
 Snow J. E.
 Throup G.
 Tozer T. C.
 Tucker M. W.
 Tym Ms D. C. MBIM
 Welsh M. MBIM
 Wilson Prof P. N.
 Young H. S. MBIM
 Young M. C. MBIM

HEREFORDSHIRE

Brimacombe R. W. MBIM
 Bullen B. S. MBIM
 Burns D. H. MBIM

Herefordshire continued

Coquet A. R. MBIM
 Grimley R. FBIM
 Hart W. J.
 Holland D. J. MBIM
 Hopkins S. W.
 Howie I. B. FBIM
 Jennings R. J. MBIM
 Jones M. G. MBIM
 Lewis C. G. MBIM
 Perry A. W.
 Price I. L. FBIM
 Roskill T. W. MBIM
 Scudamore P. H.
 Strevens P. J.
 Thompson Major W. V. H. MBIM
 Wareham D. A. MBIM
 Whitmey C. J. MBIM
 Wilder B. C. MBIM
 Williams J. C.

HERTFORDSHIRE

Adamson D. J. MBIM
 Arnold R. L. MBIM
 Brereton J. MBIM
 Castle D. M.
 Causton A. E. MBIM
 Conder K. J. MBIM
 Coslett D. A.
 Edwards A. D. MBIM
 Gardner D. A.
 Goodwin A. J. R. MBIM
 Grimley R. FBIM
 Hawkins Mrs V. R. MBIM
 Ingram R. C. MBIM
 Johnson D. T. FBIM
 Jones Davies D. M. C. MBIM
 Massey J. E. FBIM
 Moffit R.
 Morton R. J. MBIM
 Palmer W. J.
 Parker R. B.
 Thackray G. A. MBIM
 Thompson G. C. FBIM
 Ward Dr J. FBIM

HULL & HUMBERSIDE

Brocklebank M. MBIM
 Clarke H. E. MBIM
 Doran C. J. MBIM
 Fort J.
 Glover R. H.
 Hayes P. M.
 Heald F. R. MBIM
 Hill C. F. MBIM
 Jordan D. A. CBIM
 Lamming S. V. MBIM
 Marsden A. MBIM
 Martinson P. R. MBIM
 Mewburn J. H.

Hull & Humberside continued

Neate D. J. H. FBIM
 Nutting K. E.
 Owen D.
 Pearson A. M. FBIM
 Proctor-Rushworth F. MBIM
 Scarr W. A.
 Stocks R.
 Thompson N.
 Tindale G.
 Waters R. L.

KENT

Amos R. C.
 Bagshaw T. W. FBIM
 Bateman J. H. MBIM
 Binnie J. E. MBIM
 Bryson T. MBIM
 Carr H. R. FBIM
 Carroll P. R. FBIM
 Caspell N. MBIM
 Chater R. M. MBIM
 Coombe-Jones J. K. MBIM
 Fisher A. MBIM
 Harland P. H.
 Henson J.
 Hill G. P.
 Hukins S. R.
 Jackson M. MBIM
 Knight D. J.
 Knight D. J. MBIM
 Knight S. W.
 Little R. J.
 Macwatt C. S. H.
 Martin R.
 Meyler S. MBIM
 Nicholson J. A. H. FBIM
 Nix Prof J. FBIM
 Older C. D.
 Page Miss G. M.
 Parkin W. K. MBIM
 Perkins D. M. FBIM
 Pope V. V. FBIM
 Reid I. G.
 Rigden S. R. MBIM
 Roberts C. D. F.
 Roberts D. J. FBIM
 Robertson R. A.
 Rogers K. R. MBIM
 Rogers P. MBIM
 Sander-Humphrey B. H. MBIM
 Shead T. MBIM
 Smith C. J.
 Smith D. P. FBIM
 Sparrow T. D. FBIM
 Spence F. A. FBIM
 Stoneman D. F. FBIM
 Stonham G. H. MBIM
 Sutton P. J. MBIM
 Toms D. A. MBIM
 Toohay M. J. D.

Kent continued

Truscott P. D. MBIM
 Webster J. P. G. FBIM
 Williams N. T. MBIM
 Winch D. A. MBIM

LANCASHIRE (including Manchester & Merseyside)

Asigbee E. M.
 Barker M. P.
 Bell J. G.
 Birkby J.
 Booth P. J.
 Bridge J. D.
 Byrne T. MBIM
 Close J. S.
 Davies J. MBIM
 Ford R. F. MBIM
 Gorst J. E.
 Gorst J. R.
 Halhead D. C.
 Hewitt W. E.
 Higgin R.
 Hull L. H.
 Ishmael D. W.
 Johnson D. G.
 Kirkhail R. A.
 Kirkman R. F.
 Millen W.
 Mitchell E.
 Mitchell J.
 Moore S.
 Morgan J. L. MBIM
 Murgatroyd E. MBIM
 Murray D. J. MBIM
 Park A. W.
 Parry C.
 Ratcliffe C. R. MBIM
 Richmond R. W.
 Rushton R. T. MBIM
 Shepherd J. B.
 Simpson D.
 Sweet A. G. MBIM
 Taylor R. G.
 Thomson G. B. MBIM
 Thompson P. MBIM
 Thorn P.
 Todd A. S.
 Tomlinson C. T.
 Tomlinson T.
 Walker D.
 Welton D. E.

LEICESTERSHIRE

Aston P. J. M. FBIM
 Acafa A. A. MBIM
 Boreham R. B. MBIM
 Brown A.
 Elderfield P. FBIM
 Harris S. G.

Leicestershire continued

Hurst D. W. FBIM
Johnson G. W. MBIM
Joyce D.
Keene A. C.
Kerr H. W. T. FBIM
Molyneux M. A. MBIM
Packe-Drury-Lowe S. J.
Tipper B. C.
Wallace A. S. MBIM

LINCOLNSHIRE

Arden Miss M. S.
Atkin W. J. MBIM
Austin R. W. FBIM
Barlow R. P.
Barwell M. G. MBIM
Birkett F. H. MBIM
Bransfield P.
Braybrook D.
Brearley B. M. FBIM
Bullivant A. F.
Burns J. A.
Clarey J.
Cragg W. S. MBIM
Day J. O. FBIM
Dorrington J. B. FBIM
Dorrington S. P. FBIM
Drake H. C. MBIM
Early B. E.
Elvidge D. J.
Farley V. FBIM
Findlay J. O. MBIM
Fox R.
Garner D. I.
Gibbons P. H. MBIM
Gillett G. S. W.
Grant J. E.
Hancox R. MBIM
Hargreaves L. H.
Haworth J. P. S.
Heald J. M. MBIM
Hodgson P. N. MBIM
Hustler W. MBIM
Keeling A. MBIM
Kennedy M. J. MBIM
Kerrigan M. FBIM
Killick P.
Leggott J. P. B.
Louth R. W. MBIM
McMichael G. MBIM
Morris A. B. MBIM
Neal S. G.
Piccaver D. J. T.
Proctor A. H.
Proctor J. H.
Robertson E. A. FBIM
Robertson I. J. F.
Smith W. J.
Stott C. A. P. CBIM
Summerland M. D. MBIM
Ursell I. MBIM

Walker D. C.
Wallace P. J.
Wells S.
Williams M. F. J. MBIM
Wynn P. G. MBIM

GREATER LONDON

Akande S. B.
Andrews J. FBIM
Bays D. C.
Brook D. C. L. MBIM
Clark G. S. MBIM
Coward N. FBIM
Dancey R. J. FBIM
Dorey R. F. FBIM
Eaves C. J. MBIM
Ezewe M. L. MBIM
Farley Ms S. MBIM
Gordon-Lee J. D. FBIM
Graves H. C. H.
Hall C. F. FBIM
Hickey G. J.
Ijeona S. O. MBIM
MacPherson G. A. FBIM
McKinlay W. W. MBIM
McLellan P. J. MBIM
McOran-Campbell A. G.
Mulcahy-Morgan P. FBIM
Ngwe E. U. MBIM
Phiri M. J. M.
Porter W. E. MBIM
Raath M. H. FBIM
Sefah-Duah D.
Vernon Roberts W. FBIM
Warrender W. G. MBIM
Whytock A. H. FBIM
Williams A. T. FBIM

NORFOLK

Adshead R. J. MBIM
Allen J. G.
Alston I. J.
Arkey C. M. MBIM
Austen J. S.
Bond F. S. FBIM
Boyt E. F. MBIM
Buckingham G.
Bunn R. C. FBIM
Clancy S. M. MBIM
Cook D. M. MBIM
Cornish Lt Col E. E. C. MBIM
Cox P.
Dixon R. G. J. MBIM
Eglington B. D.
Emmett R.
Farnham C.
Garner D. A.
Gillespie J.
Harris B. MBIM
Hill D. W. J. MBIM
Howlett R. M.

Norfolk continued

Hubbard H. R. MBIM
 Knowles W. H.
 Mack L. F.
 Manners J. G.
 McClean S. P.
 Mitchell G. W.
 Morgan K. FBIM
 Mutimer R. I. FBIM
 Napthew M. R.
 Pearce D. G. FBIM
 Pepper R. S. W. G. MBIM
 Perry J. FBIM
 Rowe Mrs C.
 Salmon R. J.
 Sargent M. P.
 Seligman P. FBIM
 Sloan W. M. MBIM
 Simpson R.
 Smith N. J. MBIM
 Spinks I. M.
 Starling R. G. E. FBIM
 Steed N. J. MBIM
 Steven R.
 Sumner R. L. G. MBIM
 Thorby J. D. P. MBIM
 Watkins D. I. MBIM
 Witton E. P.
 Wooley N.
 Young P. J. MBIM

TYNE & WEAR and NORTHUMBERLAND

Anderson J. P. R. MBIM
 Armstrong H. J.
 Clift J. H. MBIM
 Crangle B. J. FBIM
 Mallen R. T.
 Oates R. G.
 Pardoe T. J. MBIM
 Roger-Coltman W. J.
 Sanderson T. N. H.
 Storrar R. M. MBIM
 Straker N. D. B. MBIM

ORTHANTS

Day B. R.
 Edwards R. A. MBIM
 Fletcher D. FBIM
 Garner A. C. MBIM
 Gaunt W. C. E.
 Lyon T. S. MBIM
 McDonald S.
 Moore B. L. MBIM
 Williams T. M. MBIM
 Wood J. MBIM

NOTTINGHAMSHIRE

Brunton M. B. MBIM
 Drury D. J. MBIM
 Hoyland B. T.

Nottinghamshire continued

Husselbee P. FBIM
 Murch P. S.
 Parker Miss J. E.
 Scott A.
 Smithers R. S. MBIM
 Thompson G.
 Wright C.

OXFORDSHIRE

Birtles J. P. FBIM
 Bridgeman M. R.
 Brown R. H. E. MBIM
 Bruce-Fielding R. M. MBIM
 Cherry W. E. P. MBIM
 Cobham R. O.
 Daniels R. M. FBIM
 Darby R. C. MBIM
 Fox C. R. M. MBIM
 Hearne Dr A. S. MBIM
 Heydon D. L. MBIM
 Hood C. J.
 Keene D. R.
 Kirby M. R.
 Lowe A. N.
 Oxtoby K. N.
 Parrett A. D. MBIM
 Street Dr P. R. MBIM
 Summers J. H.
 Trotter C. J. R. FBIM
 Wigley T. A. MBIM

SHROPSHIRE

Bacon J. K. FBIM
 Beckett G.
 Beckett J. H.
 Bradley B. P. FBIM
 Broadway L. O. MBIM
 Cutting N. D.
 Eyres R. G. FBIM
 Henderson C. A. MBIM
 Hughes D. MBIM
 Kaye D. M. FBIM
 Metcalfe K.
 Millington D. B. MBIM
 Mortimer R. G.

STAFFORDSHIRE

Bower J. S. MBIM
 Coates J.
 Dally A. E. H. MBIM
 Dunlop J.
 Hackey K.
 Hill A. J.
 James D. R.
 Lycett R. A.
 Needham A.
 Tavenor A. J.
 Tunley J. G.

SUFFOLK

Agar N. S. FBIM
Allerton D. M. MBIM
Ashburn M. J. MBIM
Baker J. E. FBIM
Black R. J.
Coe H. P. G. MBIM
Egerton F. R. MBIM
Fiske N. J. FBIM
Gabain R. G.
Gooding R. MBIM
Hendy P. T.
Hill J. FBIM
Hordern H. C. MBIM
Hyde Parker Sir R. FBIM
Keer J. W. MBIM
Kunkler P. B. FBIM
Le Blanc Smith R. M. MBIM
Lee D. G. FBIM
Linton Clowes C. J. MBIM
Macrae Miss M. M. P. MBIM
Mayhew R. J. MBIM
Miszewski K. MBIM
Myram C. MBIM
O'Brien M. J. D. MBIM
Paice J. E. T.
Pettit C. H.
Prior S.
Simmonds V. J. E.
Stanners R. H. MBIM
Thirkell J. D. FBIM
Turner J. A. MBIM
Upton R. J. FBIM
Vincent G. W. FBIM
Westrope P. R. C.
Widby Hart J. FBIM
Wright T. L. FBIM

SURREY

Abbott T. M. FBIM
Bloomer S.
Bolton T. H.
Burr P. D.
Carter Brig A. W. MBIM
Cocking W. P. FBIM
Codd M. MBIM
Colton P. H.
Culpin T. D. MBIM
Davis J. H.
Evans M. W. FBIM
Fox T.
Gamon V. C. FBIM
Hayes B. FBIM
Hibbeert W. J. FBIM
Jones M. J. MBIM
Lester E. A. K. FBIM
Luckin P. S. MBIM
Mills B.
Morgan D. E. MBIM
Mouton N. W. MBIM

Surrey continued

Parrott A. W. MBIM
Phillips P.
Plavford G. MBIM
Poulson A. E.
Rae I. F. MBIM
Rogers P. MBIM
Salvidge P. M.
Stannard E. J. MBIM
Stewart C.
Williams S.
Wolfenden Capt M. E. H. MBIM

SUSSEX

Beaumont M. A. H. MBIM
Beilby J. P. MBIM
Braden P. G.
Carslaw K. S. E. MBIM
Collinson P.
Coomber D. H. MBIM
Coote R. B. FBIM
Courtney J. D. MBIM
Eager R. N.
Handley E. MBIM
Harrison J. E. FBIM
Harrison R. FBIM
Haydon R. G. L. MBIM
Hayter C. A.
Hewitt M.
Hume A.
Johnstone B. R. MBIM
McEwan T. R. MBIM
McFadden M.
Mewett K. H. G.
Morgan Rees A. M. FBIM
Morris B. P. W. FBIM
Neill A.
Phillips D. J. MBIM
Raikes T. M. M. MBIM
Ratcliffe G. E. MBIM
Robinson J. H. MBIM
Scott K.
Shaw P. FBIM
Shrubbs N. F.
Spiby G. A. MBIM
Spiby G. A.
Spofforth M. G.
Sullivan D. W. K. MBIM
Swarbrick O. FBIM
Wilson J. P. FBIM
Winsloe R. D. FBIM
Wishart L. B.

WARWICKSHIRE and WEST MIDLANDS

Almond G. W. J.
Bird P. C. J. FBIM
Black W. M. MBIM
Crabtree P. FBIM
Dalby A. A. MBIM
Dymond A. J. MBIM
Hastings M. R. FBIM

Warwickshire & West Midlands continued

Hearth J. D. M. CBIM
Jackson G. H. FBIM
Maley Miss B.
Mathias C. H. MBIM
Mathias C. H. MBIM
McGraham R. FBIM
Measures A. R. MBIM
Mills P. D. FBIM
Msimuko J. P.
Neilson K. G. FBIM
Nott W. H. M. MBIM
Taylor J. R. MBIM
Thompson H. D.
Weston W. C. FBIM

WILTSHIRE

Austead N.
Barker D. V. FBIM
Cooke D. G. W.
Cooper R. H.
Cox C. M. MBIM
Cox E. W.
Cuttell G. P. MBIM
Dalton I. R.
Day P. C. C. FBIM
Deague G. A. MBIM
Duncan C. J. FBIM
Fitzgerald D. J. MBIM
Fitzherbert-Brockholes R.
Hartley F. R. D. MBIM
Hughes E. W. MBIM
Jeary P. T. MBIM
Jones D. I.
Langdon M. P.
Lugg G. W. J. FBIM
Maycock R. G.
Maynard B. A. CBIM
Pollard R. G. MBIM
Rasch S. A. C. MBIM
Rider J. C. MBIM
Rowland M.
Smith P. C. MBIM
Webb S. D. MBIM

WORCESTERSHIRE

Ameron A. J. MBIM
Fowler R. J. G. MBIM
Holt P. S. MBIM
Hopkins S. W.
Ruddock J. G. FBIM
Stott P. R. MBIM
Thompson Major B. MBIM

NORTH YORKSHIRE

Ackerley J. MBIM
Barrett J. R.
Bowles E. B.
Carter A. FBIM
Cockerill M. R. MBIM
Cooper K. MBIM
Darley G.

North Yorkshire continued

Fairburn H. L.
Gibson R. A. FBIM
Grice P. D.
Hamilton J. M.
Hesk P. C. FBIM
Horton-Fawkes G. N. Le G.
Milton H. R. A. MBIM
Palmer H.
Pardoe A. R.
Perry D. B. MBIM
Robinson J. H.
Tagg D. W. FBIM
Wade A. R.
Webster S. G. MBIM
Williams A. J. FBIM
Worsley G. O. MBIM

SOUTH YORKSHIRE

Booth Mrs S. MBIM
Holmes M. G.
Thorpe A. MBIM

WEST YORKSHIRE

Buckley H.
Earl J. J. C. MBIM
Elmhirst R. N. MBIM
Green J. R. H. MBIM
Hammond M. J. MBIM
Joce E. H. B.
Mitchell W. FBIM
Maclan J. FBIM
Pearce M. G. R.
Sale P. M. FBIM
Sellars P. MBIM

Scotland

BORDERS

Allen D. H. MBIM
Burnham T. A. MBIM
Dick R. I. FBIM
Fisher B. W. MBIM
Fleming T. MBIM
Fleming T. Jnr
Forbes McCulloch A. MBIM
Mountrie G. A.
Murdoch G. A.
Sloan R.
Tennant T. W.
Usher C. J. FBIM
Wales-Fairbairn A. G. FBIM
Wemyss A. G. MBIM

CENTRAL SCOTLAND

Fraser I. R. MBIM
Tullis K. W. MBIM

DUMFRIES & GALLOWAY

Butlin E. A. MBIM
Byre G. W. H. FBIM

Scotland continued

Cox J. P. MBIM
 Johnston J. M. MBIM
 McDiarmid I. MBIM
 Moore C. J. MBIM
 Smith A.
 Smith B. MBIM
 Watson R. N.
 Wilson J. V. T. MBIM

LOTHIAN

Anderson J. L. MBIM
 Blyth A. FBIM
 Cheyne J. M. T. MBIM
 Fletcher A. D. T.
 Gray G. B. R. FBIM
 Hamilton M. J. MBIM
 Hardy R. P. MBIM
 Kane J.
 Kerr J. MBIM
 MacGregor J. D.
 Martin S. W. MBIM
 Mordaunt F. D.
 Middlemass I.
 Milligan A. G. MBIM
 Robertson L. CBIM
 Selby W. W. FBIM
 Sheddon J. J. MBIM
 Stevenson J. M. FBIM
 Tait S. E.
 Todd E. C. MBIM
 Thomson T. S. MBIM
 Weir I. C.
 Wilson R. T. FBIM
 Wyllie J. H. MBIM

FIFE

Elder W. B. R. FBIM
 Erskine T. P. N.
 MacGregor G.
 Pratt J. A. MBIM
 Stirling A. V.
 Towler P. D. MBIM

GRAMPIAN

Allathan R. E. FBIM
 Attenborough W. J. FBIM
 Auton E. H. FBIM
 Bone J. S.
 Booth J. A.
 Bruce G. R. MBIM
 Buchan R. D. MBIM
 Caldwell W. M. MBIM
 Edwards Dr L. E. MBIM
 Fyfe M. H. D. F.
 Graham T. C. FBIM
 Hartley N.
 Irvine Major F. C. O.
 Irvine Q. H. R. FBIM
 Isacss R. J. MBIM
 Keith I. B. MBIM

Scotland continued

Kemp J. MBIM
 Leith J. D. M. MBIM
 MacDonald J. MBIM
 MacFarlane A. R. FBIM
 McCubbin A.
 Mackison S. A.
 Maddox J. M. MBIM
 Massie A. W.
 Pack B. S.
 Sutherland R. M.
 Woolridge-Gordon, Capt R.
 Wisely N. R. MBIM

HIGHLAND

Anderson R. MBIM
 Christie D. MBIM
 Cramond R. D. FBIM
 Gall J. M. MBIM
 Gilzean J. A. MBIM
 Joughin M. FBIM
 MacDonald G. G.
 Robertson N.
 Rose J.
 Shaw R. K. MBIM
 Tait W. I. FBIM
 Tracey A. B. K.

STRATHCLYDE

Adesoji Ojo A. MBIM
 Hunt R. W. T.
 Mackay A. J. D. FBIM
 Marshall D. MBIM
 McDougall J. C. FBIM
 Moore W. T.
 Preston K. A.
 Smith P. G.
 Shaw D. FBIM
 Taggart Dr W. J.
 Wilcox J. P. MBIM
 Wyllie W. A. S. MBIM
 Yates K. C. FBIM
 Young M. J. R.

TAYSIDE

Black W. H. M. FBIM
 Bremner A. FBIM
 Bruce J. M. E.
 Gooch J. D. FBIM
 Hardie M. MBIM
 Kay D. MBIM
 Laing D. A. MBIM
 Law H.
 Law Ms H.
 Moisey F. R.
 Morison A. J. MBIM
 Ord P. J. MBIM
 Robertson S.
 Simpson A. W.
 Smythe D.
 Wilson R. M.

Wales

CLWYD

Barritt M. E.
Lewis P. R. MBIM
Matheson J. R. MBIM
Williams A. J. MBIM

DYFED

Clench S. F.
Ellis H. L.
Hitchings J. B.
Jones C. M. MBIM
Jones C. T. MBIM
Moses H. MBIM
Paget D. J.
Williams J. R. MBIM

GWENT

Brown D. MBIM
Herbert J. J. MBIM
Park N. S.
Rose M. J. MBIM

GWYNEDD

Brown W. MBIM
Glyn-Jones J. MBIM
Price D. C. MBIM

MID GLAMORGAN

Williams A. T. MBIM
Williams D. E. MBIM

SOUTH GLAMORGAN

Akerjola Dr D. F. MBIM
Davies A. E. MBIM
Morgan C. MBIM
Richards A. C. H.

POWYS

Evans T. M. K. FBIM
Fromant A. F. MBIM
Haywood-Hicks P. M. D. MBIM
Kendrick A. R. MBIM

Northern Ireland

Allen D. H. MBIM
Bayne B. E. F. MBIM
Cunningham W. L. MBIM
Donoghue M. V. MBIM
Ferguson E. H. H.
McRoberts T. W. I. MBIM
Robinson W. MBIM
Spence S. G. MBIM

Eire

Coveney P. N. M.
Dean B. G. FBIM

Hanly B. J. FBIM
Hickey J. F. MBIM
Higgins P. J. MBIM
MacCanna P.
Mahon J. P.
Tierney J. A.

Overseas

AUSTRALIA

Cole D. G. MBIM
Onslow Miss C. M.
Reeve-Cox D. R. FBIM

BOTSWANA

Summers M. MBIM

CAMEROON

Wara B. F. FBIM

CANADA

Bunjun P. MBIM
Sheridan K. W. MBIM

CYPRUS

Conomis J. C. MBIM
Hadjikriacou S. MBIM
Pashourtides P. MBIM

DENMARK

Lund J. E. FBIM

FRANCE

Baker T. R. FBIM
Wright J. A. MBIM

GHANA

Obe B. N.

HONG KONG

Dickson A. G. MBIM

INDIA

Ananth K. C. FBIM
Datta S. K. MBIM
Goswami N. K. L. FBIM

JORDAN

Gibson I. E. FBIM

KENYA

Campori G. MBIM
Halstead W. R. FBIM
Keen I. S. FBIM
McConville B. P. MBIM
Salim S. M. MBIM

KUWAIT

Dubridge D. B. MBIM

Overseas continued

MALAWI

Godwin D. F. FBIM
Kennard R. W. MBIM

MALAYSIA

Arshad Ayub FBIM
Aziz A. A. L. A. MBIM
Choong F. L. MBIM
Joo T. B. MBIM
Latiff M. K. MBIM
Kwee C. W. MBIM
Muniandy R. MBIM
Noordin-Keling Dr M. FBIM
Raja Dr M. MBIM
Saw H. G. FBIM

MAURITIUS

Rhodes J. J. MBIM

NIGERIA

Adeola G. G. MBIM
Adewunmi O. B. FBIM
Abdulai J. G. MBIM
Adeleke A. R. MBIM
Akinmoladun G. A. MBIM
Alabi J. A.
Alugbuo C. C. MBIM
Aningwu G. C. MBIM
Arugu R. E. MBIM
Avajah J. T. MBIM
Bamgbose S. O. MBIM
Ibe D. G. FBIM
Ige S. A. MBIM
Mekini C. I. D. MBIM
Nkwocha A. O. MBIM
Nnorom E.
Oaten R. MBIM
Odiari A.
Okelola O.
Omotunde O. C. MBIM
Onwuagana A. B. C. FBIM
Onwukwe A. C. MBIM
Opara J. N. FBIM
Orjiekwe J. J. MBIM
Oyeleke MBIM
Raji A. O. MBIM
Singh D. S. MBIM

NEW ZEALAND

Dent J. B. FBIM

Overseas continued

PAKISTAN

Saleem A. M. MBIM

PAPUA NEW GUINEA

Baynes P. D. MBIM
Johnson R. M. MBIM
Wilkinson J. P. MBIM

SINGAPORE

Hoi H. A. MBIM
Sakathevan S. M. MBIM

SIERRA LEONE

Abdulai J. G. MBIM

SWEDEN

Nelson B. O.

SWITZERLAND

Grob G. R. MBIM

SOUTH AFRICA

Grant W. D.
Jurgens C. A. MBIM
Harrison J. E. FBIM

SPAIN

Black A. J. MBIM

SAUDI ARABIA

Beck S. A. MBIM

SOUTH AMERICA

Latcha M. MBIM
Jones D. R. FBIM

TRINIDAD & TOBAGO/WEST INDIES

Lazare A. F. MBIM
McSween G. J. MBIM

USA

Rounthwaite D. P.
Saxton J. FBIM

ZAMBIA

Lyabola T. M. MBIM
Moonga B. A. M.
Mulevu M. B. MBIM
Reza D. S. M. MBIM
Von Koch Miss A. MBIM

Products & Services Index

Abattoirs		
Dexstar Chemicals Ltd.	85	
Rentokil Ltd.	77	
Accountancy Services		
A.K.C. Ltd.	8	
Agricultural Computer Services	67	
Agricultural Construction Engineers		
Barrington, D. J.	28	
Agricultural Electronic Control & Monitoring Systems		
Eshtronic Agricultural Ltd.	20	
Agricultural Engineers		
Shukers	86	
Agricultural Fertilizers		
Norsk Hydro Fertilizers	Bookmark & 33	
WF Fertilizers Ltd.	28	
Agricultural & Horticultural Consultants		
A.K.C. Ltd.	8	
Gro-Well Pigfeeds Ltd.	2	
Agricultural & Horticultural Fertilizers		
Humber Fertilisers PLC	25	
Agricultural Machinery Manufacturers/Suppliers		
AF Trenchers Ltd.	99	
Blanch, Alvan, Development Co. Ltd.	56	
Cabcraft Ltd.	72	
Dalton Supplies Ltd.	6	
Dexstar Chemicals Ltd.	85	
Hay, Alex G.	71	
Hunday Electronics Ltd.	66	
JRT Agricultural	70	
Marmax	13	
Massey Ferguson	18	
Mobile Seedcleaning Services	82	
Sutherland, J. and A., & Co. Ltd.	22	
Air Compressors		
Overes Engineering	45	
Animal Feed Preparation Plant—Manufacturers/Suppliers		
Blanch, Alvan, Development Co. Ltd.	56	
Animal Feed Storage Bins & Augers		
Manus (Great Britain) Ltd.	46	
Animal Foodstuffs Manufacturers/Suppliers		
Cattle		
Dexstar Chemicals Ltd.	85	
Marmax	13	
Sutherland, J. and A., & Co. Ltd.	22	
Animal Foodstuffs Manufacturers/Suppliers		
Pig		
Gro-Well Pigfeeds Ltd.	2	
Sutherland, J. and A., & Co. Ltd.	22	
Animal Foodstuffs Manufacturers/Suppliers		
Poultry		
Perrys Portables	56	
Sutherland, J. and A., & Co. Ltd.	22	
Animal Foodstuffs Manufacturers/Suppliers		
Sheep		
Dexstar Chemicals Ltd.	85	
Marmax	13	
Sutherland, J. and A., & Co. Ltd.	22	
Animal Health		
Hoechst UK Ltd.	37	
Animal Identification		
Dalton Supplies Ltd.	6	
Asphalt/Batmac		
McGavock Contracts	8	
Batteries/Exhausts		
Tyreservices Great Britain	74	
Big Bale Silage (Bags, Ties, Nets)		
Marmax	13	
Building Construction		
Browns of Wem Ltd.	54	
Economic Forestry Group PLC (Hare Buildings)	63	
Grano Ltd.	49	
JRT Agricultural	70	
Kass Group	6	
London Brick Buildings Ltd.	61	
Pablo Erection Services	62	
Perrys Portables	56	
Sangwin Concrete Products Ltd.	73	
Building—Relocatable		
Pablo Erection Services	62	
Car Sales/Agents		
Hattons (St. Helens) Ltd.	92	
Kennings Ltd.	92	
Cartridge Manufacturers		
Raker	52	
Cereal, Potato & Protein Brokers		
Roddick, T. G., & Co. Ltd.	82	
Civil Engineers		
JRT Agricultural	70	
Kass Group	6	

Marmax	13	Disinfectants	
Pablo Erection Services	62	Dexstar Chemicals Ltd.	85
Sangwin Concrete Products Ltd.	73		
Communication Systems		Drainage & Irrigation Equipment	
Acorn	106	AF Trenchers Ltd.	99
		Case Poclain Ltd.	16 & 17
		Marmax	13
		Ryan Pipe Ltd.	100
Compressors (Up to 175cfm)		Drainage & Irrigation Services	
Manor Plant Hire	10	Griffiths, Norman, & Co.	100
		JRT Agricultural	70
Computerised Out-of-Parlour Feeding		Leicestershire Drainage Co. Ltd.	98
Manus (Great Britain) Ltd.	46	Ridge, D. S. & E. M., Ltd.	101
		Salmon, John, Land Drainage Ltd.	102
Computers—Hardware		Excavation	
Agricultural Computer Services	67	AF Trenchers Ltd.	99
Bartholomews Business Systems	66	Fenton, Claude, Ltd.	20
Farmdata Ltd.	65	JRT Agricultural	
Hunday Electronics Ltd.	66	Sangwin Concrete Products Ltd.	
Manus (Great Britain) Ltd.	46		
Unilever Computer Services Ltd.	64		
Computers—Software		Feeders	
A.K.C. Ltd.	8	Dalton Supplies Ltd.	6
Agricultural Computer Services	67	Gro-Well Pigfeeds Ltd.	2
Bartholomews Business Systems	66	Hunday Electronics Ltd.	66
Farmdata Ltd.	65	JRT Agricultural	70
Hunday Electronics Ltd.	66	Manus (Great Britain) Ltd.	46
Manus (Great Britain) Ltd.	46		
Unilever Computer Services Ltd.	64		
Concrete Manufacturers		Fencing	
Concrete Systems Ltd.	34	Kass Group	6
		Perry's Portables	56
Concrete Retaining Walls		Sangwin Concrete Products Ltd.	73
Bell & Webster Ltd.	26	Watts, A., Forestry	3
		Finance	
Constructional Engineers		A.K.C. Ltd.	8
De Ville & Lear	54	Agricultural Computer Services	67
		Chartered Trust PLC	41
Construction Equipment		National Westminster Bank	OBC
Case Poclain Ltd.	16 & 17		
Contractors		Fireproofing	
Chunnel Plant Hire	14	Acemedal Ltd.	61
		Forestry Services	
Crop Protection Chemicals/Equipment		Fountain Forestry Ltd.	22
Evers & Wall Ltd.	68	JRT Agricultural	70
Interlates Ltd.	84	Raker	52
Marmax	13	Watts, A., Forestry	3
Raker	52		
Stored Crop Conservation Ltd.	85	Four Wheel Drive Vehicle Manufacturers & Dealers	
		Croall Bryson & Co. Ltd.	90
Crop Protection—Services & Stockists		Dutton-Forsshaw Kent	89
Stored Crop Conservation Ltd.	85	Hewitts Garages Ltd.	89
		Kenning's Ltd.	92
Crop Weighing & Recording		Lex Mead Newport	91
Weighwrite	96	Macrae & Dick Elgin	89
		Meirion Motors	88
Cultivation Machinery—Manufacturers/Suppliers		Offley Brothers Ltd.	90
Blanch, Alvan, Development Co. Ltd.	56	Shukers	86
		Fuels & Lubricants	
Dairy Chemicals		Phoenix Petroleum Ltd.	10
Dexstar Chemicals Ltd.	85	Ultramar Golden Eagle	IFC
Manus (Great Britain) Ltd.	46	Watson Petroleum	18
Dairy Hygiene/Electronics		Fuel Pumps, Tanks & Equipment	
Agricultural Technical Aids Ltd.	46	Older, A. J., (Contractors) Ltd.	24

Grain Drying & Handling Equipment—Manufacturers/Suppliers	
Blanch, Alvan, Development Co. Ltd.	56
Grain Protection/Storage	
Blanch, Alvan, Development Co. Ltd.	56
Grano Ltd.	49
Raker	52
Rentokil Ltd.	77
Grain Services	
Bell & Webster Ltd.	26
Ludlow (Farm Laboratory) Services Ltd.	Insert
Mobile Seedcleaning Services	82
Gun Makers	
Gun Maker (McKay, David)	52
Logistics Contractors	
Express Deliveries (Coventry)	80
High Pressure Washers	
Inveresk Engineering	45
Hydraulic Equipment—Pipe, Tube & Fittings	
A1 Hydraulics Ltd.	14
Hygiene Products	
Dexstar Chemicals Ltd.	85
Rentokil Ltd.	77
Insulation	
Acemedal Ltd.	61
Pennor, Ron, & Sons	58
International Semen Distributors for Holsteins	
P.H.P. Ltd.	48
Livestock Identification Products	
Ketchum Manufacturing Co.	102
Livestock Marketers	
Select Livestock Producers Ltd.	4
Livestock Scales/Weigher Manufacturers	
Precision Weighers	96
Weighwrite	96
Manure Spreaders	
Elk Ltd.	26
Materials Handling	
Case Poclain Ltd.	16 & 17
Milking Machines	
Manus (Great Britain) Ltd.	46
Nu Pulse (Europe)	38
Paper Sack Manufacturers	
East Riding Sack & Paper Co.	58
Perimeter Security	
Raker	52

Pest Control	
Bowles, J. A., & Son	77
Dexstar Chemicals Ltd.	85
Raker	52
Rentokil Ltd.	77
Plant Hire	
Chunnel Plant Hire	14
JRT Agricultural	70
Kass Group	6
Manor Plant Hire	10
Sangwin Concrete Products Ltd.	73
Polyester Filter Manufacturers	
Big O Filters UK Ltd., The	98
Potato Protection/Storage	
Stored Crop Conservation Ltd.	85
Pressure Cleaning Chemicals	
Dexstar Chemicals Ltd.	85
Property Advice	
Edwards, Bigwood & Bewlay	4
Property Sales	
Edwards, Bigwood & Bewlay	4
Pumps	
Inveresk Engineering	45
Sangwin Concrete Products Ltd.	73
Rent Reviews	
Edwards, Bigwood & Bewlay	4
Repair Services	
A1 Hydraulics Ltd.	14
Inveresk Engineering	45
Roofing/Room Repairs	
London Brick Buildings Ltd.	61
Technoproof Ltd.	62
Round Bale Handling Equipment	
Elk Ltd.	26
Saw Mills	
Economic Forestry Group PLC (Hare Buildings)	63
Silage Services	
Atkinson Brothers	48
Bell & Webster Ltd.	26
Grano Ltd.	49
Marmax	13
Slats	
Grano Ltd.	49
Sangwin Concrete Products Ltd.	73
Slurry Services	
Bell & Webster Ltd.	26
Specialist Machine Movement with Lifting Equipment	
Express Deliveries (Coventry)	80

Spray Foam Insulation	
Acemedal Ltd.	61
Spring Balance Manufacturers	
Precision Weighers	96
Steam & Pressure Cleaning Contractors	
Hydroblast of Didcot	45
Steel Framed Buildings	
Buildwell Construction Ltd.	IBC
De Ville & Lear	54
Steel Suppliers	
Kass Group	6
Steel & Timber Buildings	
Browns of Wem Ltd.	54
Tenancy Successions	
Edwards, Bigwood & Bewlay	4
Tractors	
Cabcraft Ltd.	72
Tyres	
Kenning Tyre Services	13
Macrae & Dick Elgin	89
Tyreservices Great Britain	74
Valuations	
Edwards, Bigwood & Bewlay	4
Veterinary Products	
Agricultural Technical Aids Ltd.	46
Dexstar Chemicals Ltd.	85
Gro-Well Pigfeeds Ltd.	2
Weighing Machine Manufacturers	
Precision Weighers	96
Weighing—Vehicles	
Weighwrite	9
Wire Goods Manufacturers/Suppliers	
Kass Group	6

Index of Advertisers

A

A1 Hydraulics Ltd.	14
AF Trenchers Ltd.	39
A.K.C. Ltd.	3
Acemedai Ltd.	61
Acorn	106
Agricultural Computer Services	67
Agricultural Technical Aids Ltd.	46
Ashtronic Agricultural Ltd.	20
Atkinson Brothers	46

B

Barrington, D. J.	28
Bartholomews Business Systems	56
Bell & Webster Ltd.	26
Big O Filters UK Ltd., The	98
Elanch, Alvan, Development Co. Ltd.	56
Bowles, J. A., & Son	77
Browns of Wem Ltd.	54
Buildwell Construction Ltd.	1BC

C

Cabcraft Ltd.	72
Case Poclain Ltd.	16 & 17
Chartered Trust PLC	41
Chunnel Plant Hire	14
Concrete Systems Ltd.	34
Croall Bryson & Co. Ltd.	86

D

Dalton Supplies Ltd.	5
De Ville & Lear	54
Dexstar Chemicals Ltd.	85
Dulton-Forshaw Kent	90

E

East Riding Sack & Paper Co.	58
Economic Forestry Group PLC (Hare Buildings)	53
Edwards, Bigwood & Bewlay	4
Elk Ltd.	26
Evers & Wall Ltd.	66
Express Deliveries (Coventry)	80

F

Farmdata Ltd.	65
Fenton, Claude, Ltd.	20
Fountain Forestry Ltd.	22

G

Grano Ltd.	49
Griffiths, Norman, & Co.	100
Gro-Well Pigfeeds Ltd.	2
Gun Maker (McKay, David)	52

H

Hattons (St. Helens) Ltd.	32
Hay, Alex G.	71
Hewitts Garages Ltd.	89
Hoechst UK Ltd.	37
Humber Fertilisers PLC	25
Hunday Electronics Ltd.	56
Hydroblast of Didcot	15

I

Interlates Ltd.	84
Inveresk Engineering	45

J

J.R.T. Agricultural	70
---------------------	----

K

Kass Group	6
Kenning Tyre Services	13
Kennings Ltd.	32
Ketchum Manufacturing Co.	102

L

Leicestershire Drainage Co. Ltd.	93
Lex Mead Newport	91
London Brick Buildings Ltd.	61
Ludlow (Farm Laboratory) Services Ltd.	Insert

M

McGavock Contracts	8
Macrae & Dick Elgin	89
Manor Plant Hire	10
Manus (Great Britain) Ltd.	46
Marmax	13
Massey Ferguson	18
Meirion Motors	88
Mobile Seedcleaning Services	82

N

National Westminster Bank	OBG
Norsk Hydro Fertilizers	Bookmark & 33
Nu Pulse (Europe)	38

O

Offley Bros. Ltd.	96
Older, A. J., (Contractors) Ltd.	24
Oldman Agricultural Machinery Ltd.	70

P

P.H.P. Ltd.	48
Pablo Erection Services	62
Pennor, Ron. & Sons	58
Perrys Portables	58
Phoenix Petroleum Ltd.	10
Precision Weighers	96

R

Raker	52
Rentokil Ltd.	77
Ridge, D. S. & E. M., Ltd.	101
Roddick, T. G., & Co. Ltd.	82
Ryan Pipe Ltd.	100

S

Salmon, John, Land Drainage Ltd.	102
Sangwin Concrete Products Ltd.	73
Select Livestock Producers Ltd.	4

Shukers	86
Stored Crop Conservation Ltd.	85
Sutherland, J. & A., & Co. Ltd.	22

T

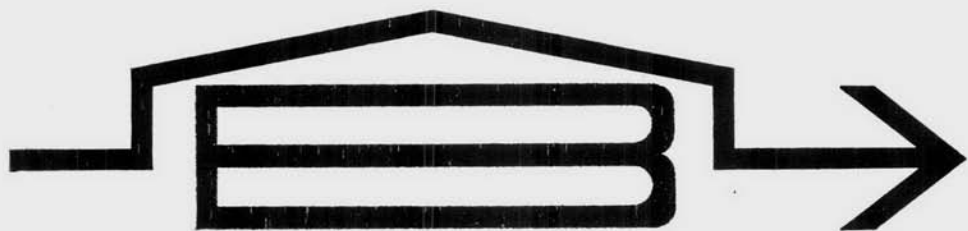
Technoproof Ltd.	62
Tyreservices Great Britain	74

U

Ultramar Golden Eagle	IFC
Unilever Computer Services Ltd.	64

W

WF Fertilizers Ltd.	28
Watson Petroleum	
Watts, A., Forestry	
Weighrite	96



Buildwell Constructions (Dorset) Limited

UDDENS TRADING ESTATE,
NEAR WIMBORNE, DORSET BH21 7NL

Telephone: 0202/871247

Telex: 41357

SPECIALISE IN DESIGN, FABRICATION AND
THE ERECTION OF STEEL FRAMED
BUILDINGS





THERE'S ONE FARMING ADVANCE THAT ISN'T SCIENTIFIC, TECHNOLOGICAL OR CHEMICAL.

Farm finance has come a long way since we started back in 1658.

By the 1890's, our reputation was such that Somerset farmers actually refused Bank of England notes in preference to those of our predecessors, Stuckey's Bank.

Today, NatWest have advanced even further, with a complete range of services that are specifically designed to meet the varied needs

IT'S FINANCIAL.

of farmers and growers. Our unique GrowCash scheme lets you buy what you need when you need it, on terms tailor-made to suit your cashflow.

Our Farm Development Loan enables you to borrow up to £250,000 for up to 20 years at fixed interest.

And we can help with estate

planning, annual taxation, insurance and the buying or leasing of machinery.

If you'd like to deal with farming finance specialists who speak your language, call into your nearest branch or write to National Westminster Bank PLC, Agricultural Office, 4 Eastcheap, London EC3M 1JH.

And take advantage of a modern farming tradition.

NatWest Agricultural Services

BETTER BANKING MEANS BETTER FARMING.