THE JOURNAL OF AGRICULTURAL SCIENCE

EDITED BY

- G. D. H. BELL, B.Sc., Ph.D., School of Agriculture, Cambridge
- E. M. CROWTHER, D.Sc., F.R.I.C., Rothamsted Experimental Station, Harpenden
- J. HAMMOND, C.B.E., M.A., D.Sc., F.R.S., School of Agriculture, Cambridge
- H. HUNTER, M.A., D.Sc., F.R.S., 176 Huntingdon Road, Cambridge
- SIR BERNARD KEEN, D.Sc., F.R.S., East African Agriculture and Forestry Research Organisation, P.O. Box 21, Kikuyu, Kenya
- SIR E. JOHN RUSSELL, D.Sc., F.R.S., Campsfield Wood, Woodstock, Oxon.
- H. E. WOODMAN, M.A., Ph.D., D.Sc., School of Agriculture, Cambridge
- F. YATES, Sc.D., F.R.S., Rothamsted Experimental Station, Harpenden

VOLUME XLV, 1955

CAMBRIDGE
AT THE UNIVERSITY PRESS
1955

Printed in Great Britain at the University Press, Cambridge
(Brooke Crutchley, University Printer)
and published by the Cambridge University Press
London: Bentley House, N.W.1
American Branch: New York
Agents for Canada, India, and Pakistan: Macmillan

CONTENTS

Part 1 (October 1954)

	PAGE
ISLAM, M. A. and Elahi, M. A. Revision of ferric iron to ferrous iron under water-logged conditions and its relation to available phosphorus. (With Two Text-figures)	1
Blackman, G. E. and Bunting, E. S. Studies in oil-seed crops. II. An assessment of the interrelationships between plant development and seed production in linseed (<i>Linum usitatissimum</i>)	3
BLAXTER, K. L., GRAHAM, N. McC. and Rook, J. A. F. Apparatus for the determination of the energy exchange of calves and of sheep. (With Plates 1 and 2 and Four Text-figures)	10
Braude, R., Clarke, P. M. and Mitchell, K. C. Analysis of the breeding records of a herd of pigs. (With One Text-figure)	19
ERASMUS, J. E. Shell porosity and shell thickness in inbred lines of brown leghorn fowls .	28
Erasmus, J. E. Relations of yolk, albumen and egg weight in inbred lines of brown leghorns	32
ROBERTSON, HAMISH and BARNETT, A. JOHN G. The free amino-acids present in fresh and in fermented marrow stem kale. (With Five Text-figures)	36
COEY, W. E. and ROBINSON, K. L. Some effects of dietary crude fibre on live-weight gains and carcass conformation of pigs	41
HUTCHINSON, J. C. D. Evaporative cooling in fowls. (With Two Text-figures)	48
Wallace, L. R. Studies in the augmentation of fertility of Romney ewes with pregnant-mare serum	60
Hancock, John. Studies in grazing behaviour of dairy cattle. II. Bloat in relation to grazing behaviour. (With Six Text-figures)	80
Hancock, John and McMeekan, C. P. Studies of grazing behaviour in relation to grassland management. III. Rotational compared with continuous grazing. (With Two Text-figures)	96
Thomas, Brynmor and Smith, Allan N. The nutritive value of Calluna vulgaris. III. Digestibility at four and ten years after burning	104
Wilson, P. N. Growth analysis of the domestic fowl. III. Effect of plane of nutrition on carcass composition of cockerels and egg yields of pullets. (With Plates 3 and 4 and Six Text-figures)	110
GREER, E. N. and GRINDLEY, G. G. The late manuring of winter wheat: an observation on the nutritive value of the grain. (With One Text-figure)	125

Part 2 (December 1954)	PAGE
Holmes, W. and MacLusky, D. S. The intensive production of herbage for crop-drying. V. The effect of continued massive applications of nitrogen with and without phosphate and potash on the yield of grassland herbage. (With Three Text-figures)	129
Fyfe, James L. Plant-breeding studies in leguminous forage crops. II. Further observations on natural cross-breeding in winter beans. (With One Text-figure)	141
HAFEZ, E. S. E. Organ development in relation to egg-laying capacity in the fowl. (With Four Text-figures)	148
TYLER, C. A further study of the effect of sulphanilamide on the metabolism of calcium and phosphorus in the laying hen	156
JOUBERT, D. M. The influence of high and low nutritional planes on the oestrous cycle and conception rate of heifers. (With Three Text-figures)	164
ROLLINSON, D. H. L. A study of the distribution of acid and alkaline phosphatase in the genital tract of the Zebu bull (Bos indicus). (With Plates 5 and 6)	173
Hughes, G. Pearson. The production and utilization of winter grass. (With Plates 7 and 8 and One Text-figure)	179
WILLIAMS, S. M. Fertility in Clun Forest sheep. (With Two Text-figures)	202
GILL, J. C. and Thomson, W. The production of ketonaemia and pregnancy toxaemia in ewes through manipulation of the feeding level. (With Two Text-figures)	229
EMERSON, W. W. Water conduction by severed grass roots. (With Four Text-figures) .	241
FLUX, D. S. and PATCHELL, M. R. The effect of undernutrition after calving on the quantity and composition of the milk produce by dairy cattle. (With One Text-figure)	246
Beatty, R. A. and Rowson, L. E. A. Note on motility and fertility of colchicine-treated bull and rabbit sperm	254
Part 3 (February 1955)	
TAYLOR, J. I., ROLLINSON, D. H. L. and HARKER, K. W. Studies on the habits of Zebu cattle. II. Individual and group variation within a herd. (With Two Text-figures)	257
SLATER, J. K. W. and Manby, T. C. D. Pilot survey of the mechanical conditions and fuel consumptions of agricultural tractors. (With One Text-figure)	264
JEWITT, T. N. and MIDDLETON, K. R. Changes in Sudan Gezira soil under irrigation	277
DE, P. K. and DIGAR, S. Influence of the rice crop on the loss of nitrogen gas from water-logged soils. (With One Text-figure)	280
HAFEZ, E. S. E., BADRELDIN, A. L. and DARWISH, Y. H. Seasonal variations in semen characteristics of sheep in the subtropics. (With One Text-figure)	283
BLYTH, J. S. S. A correlation between egg albumen weight and shank width in inbred lines of Brown Leghorns	293
WALKER, D. M. and HEPBURN, W. R. The nutritive value of roughages for sheep. I. The relationship between the gross digestible energy and the chemical composition of hays. (With One Text-figure)	298

Contents v

	PAGE
RYDER, M. L. Studies on the nutrition of wool follicles in sheep: the anatomy of the general blood supply to the skin. (With Plates 9–12 and Four Text-figures)	311
Pomeroy, R. W. Ovulation and the passage of the ova through the Fallopian tubes in the pig. (With One Text-figure)	327
King, J. W. B. and Young, G. B. A study of three breeds of sheep wintered in four environments. (With One Text-figure)	331
Beakley, W. R. and Findlay, J. D. The effect of environmental temperature and humidity on the rectal temperature of calves. (With Plate 13 and Six Text-figures)	339
Beakley, W. R. and Findlay, J. D. The effect of environmental temperature and humidity on the skin temperature of Ayrshire calves. (With Plate 14 and Eight Text-figures) .	353
BEAKLEY, W. R. and FINDLAY, J. D. The effect of environmental temperature and humidity on the temperature of the skin of the scrotum in Ayrshire calves. (With Four Text-figures)	365
Beakley, W. R. and Findlay, J. D. The effect of environmental temperature and humidity on the ear temperatures of Ayrshire calves. (With Four Text-figures)	373
JOSHI, A. B. and HOWARD, H. W. Meiotic irregularities in hexaploid oats. III. Further observations on the frequency of univalents and other meiotic irregularities in spring × winter variety hybrids of <i>Avena sativa</i>	380
Part 4 (April 1955)	
BURT, A. W. A. Some effects of season of the year and herd management upon the dairy shorthorn cow. I. The effects of seasonal changes in climate, feeding and management upon the milk yields of four herds. (With Four Text-figures)	389
Pereira, H. C. The assessment of structure in tropical soils. (With One Text-figure)	401
HUTCHINSON, J. B. and MARTIN, H. F. The chemical composition of oats. I. The oil and free fatty acid content of oats and groats	411
HUTCHINSON, J. B. and MARTIN, H. F. The chemical composition of oats. II. The nitrogen content of oats and groats	419
BIANCA, W. The effect of thermal stress on the acid-base balance of the Ayrshire calf .	428
HARRINGTON, G. and POMEROY, R. W. An analysis of carcass measurements of post-war British bacon pigs. (With Plates 15 and 16 and Twelve Text-figures)	431
BEAKLEY, W. R. and FINDLAY, J. D. The effect of environmental temperature and humidity on the respiration rate of Ayrshire calves. (With Plate 17 and Five Text-figures) .	452
BEAKLEY, W. R. and FINDLAY, J. D. The effect of environmental temperature and humidity on the frequency of the heart beat of Ayrshire calves. (With Four Text-figures)	461
BREMNER, J. M. Nitrogen transformations during the biological decomposition of straw composted with inorganic nitrogen. (With Two Text-figures)	469
WIENER, G. Migration of pedigree Ayrshire cattle in Great Britain	476

-MICHROMEMICROSCOPIC STAINS

Azocarmine
Brazillin
Brilliant Cresyl Blue
Carminic Acid
Cedarwood Oil
Cresyl Fast Violet
Field's Stain

Giemsa Stain Haematoxylin Janus Green Lacmoid Leishman Stain May-Grunwald Stain Nile Blue, etc.

Diazonium & Tetrazonium Salts Sodium Naphthyl Phosphate Stains for Fluorescence Microscopy Biological Laboratory Apparatus

Price List on application

EDWARD GURR, LTD.

42 UPPER RICHMOND ROAD EAST SHEEN, LONDON, S.W.14

Telephone: Prospect 7606 & 8051 Cables: Micromlabs, London

UNIFORM HIGH QUALITY, RELIABILITY

Now ready: "Practical Manual of Medical & Biological Staining Techniques" (330 pages, price

26e. poet free)
by Edward Gurr, author "Microscopic Staining
Techniques nos. 1, 2 & 3"

The Principles of

FIELD DRAINAGE

H. H. NICHOLSON

A second revised edition of this book is now available. 18s. net

Order through your bookseller

CAMBRIDGE UNIVERSITY PRESS

THE EMPIRE JOURNAL OF EXPERIMENTAL AGRICULTURE

THIS JOURNAL offers agricultural research workers a medium for disseminating the records and results of their investigations on the feeding and management of live stock, cultivation and manuring of crops, trial of farm machinery, agricultural economics, and experimental technique.

Vol. XXII. No. 87

CONTENTS

July 1954

- M. Ashraq and I. L. Mason: Environmental and Genetical Effects on Milk Yield in Pakistani Buffalo.
- R. L. KNIGHT: Cotton Breeding in the Sudan. Part III. American Upland Cotton.
- J. R. Thomson: The Effect of Seed Dressings Containing an Organo-Mercurial and Gamma BHC on Germination Tests of Oats.
- J. R. Barrowman, T. G. Boaz and K. G. Towers: Castration and Docking of Lambs: Use of the Rubber-ring Ligature Technique at Different Ages.
- W. B. HAINES, E. M. CROWTHER and G. J. THORNTON: Manuring Hevea V. Some Long-term Effects in the Dunlop (Malaya) Experiments.
- A. BOGDAN and A. STORRAR: The Control of Aristida and other Annuals in Kenya Rift Valley Pastures.
- M. T. RAGAB and A. A. ASKER: Twinning in Ossimi Sheep.
- H. C. Pereira and P. A. Jones: A Tillage Study in Kenya Coffee. Part I. The Effects of Tillage Practices on Coffee Yields. With Plate 5.

Royal 8vo. 11s. net. Annual subscription (four numbers) 34s. post free.

OXFORD UNIVERSITY PRESS, Amen House, LONDON, E.C.4

CONTENTS

	PAGE
BURT, A. W. A. Some effects of season of the year and herd management upon the dairy shorthorn cow. I. The effects of seasonal changes in	
climate, feeding and management upon the milk yields of four herds.	
(With Four Text-figures)	389
PEREIRA, H. C. The assessment of structure in tropical soils. (With One	
Text-figure)	401
HUTCHINSON, J. B. and MARTIN, H. F. The chemical composition of oats.	
I. The oil and free fatty acid content of oats and groats	411
HUTCHINSON, J. B. and MARTIN, H. F. The chemical composition of oats.	
II. The nitrogen content of oats and groats	419
BIANCA, W. The effect of thermal stress on the acid-base balance of the	
Ayrshire calf	428
HARRINGTON, G. and POMEROY, R. W. An analysis of carcass measure-	
ments of post-war British bacon pigs. (With Plates 15 and 16 and	
Twelve Text-figures)	431
BEAKLEY, W. R. and FINDLAY, J. D. The effect of environmental tem-	
perature and humidity on the respiration rate of Ayrshire calves.	
(With Plate 17 and Five Text-figures)	452
BEAKLEY, W. R. and FINDLAY, J. D. The effect of environmental tempera-	
ture and humidity on the frequency of the heart beat of Ayrshire	
calves. (With Four Text-figures)	461
Bremner, J. M. Nitrogen transformations during the biological decom-	
position of straw composted with inorganic nitrogen. (With Two Text-figures)	469
WIENER, G. Migration of pedigree Ayrshire cattle in Great Britain .	476

The Journal of Agricultural Science is issued every other month in parts of about 120 pages with plates and figures, four parts constituting a volume.

Quotations for available back volumes and parts may be obtained on application to the Cambridge University Press.

Papers for publication should be typewritten or written in a very legible hand, and may be sent to DR J. HAMMOND, School of Agriculture, Cambridge, or to the associate Editors. Other communications should be addressed to the University Press, Cambridge.

If Plates in excess of one per 24 pages of text or coloured plates are submitted the author may be asked to bear the cost of such Plates.

Bibliography should be given under the heading of 'References' in the following form:

Surname of authors (in alphabetical order), initials, date of publication (in brackets), title of Journal (abbreviated according to the World List of Scientific Periodicals), volume and pages of reference. In the text a reference should be quoted by the author's name and date (in brackets).

All names of Journals and books should be in italics.

Contributors will receive twenty-five copies of their papers free.

The subscription price, payable in advance, is 60s. net per volume (post free); single numbers 20s. net. Subscriptions may be sent to any bookseller, or to The Cambridge University Press, Bentley House, 200 Euston Road, London, N.W. 1.

Subscription price in the U.S.A. is \$10.50 per volume; single numbers \$3.50. Enquiries should be addressed to the Cambridge University Press American Branch, 32 East 57th Street, New York, 22.