

THE JOURNAL OF AGRICULTURAL SCIENCE

EDITED BY

G. D. H. BELL, B.SC., PH.D., Plant Breeding Institute, Cambridge
R. E. EVANS, M.SC., PH.D., School of Agriculture, Cambridge
J. HAMMOND, C.B.E., M.A., D.SC., F.R.S., School of Agriculture, Cambridge
SIR BERNARD KEEN, D.SC., F.R.S., 72 Eaton Square, London, S.W. 1
SIR E. JOHN RUSSELL, D.SC., F.R.S., Campsfield Wood, Woodstock, Oxon.
E. W. RUSSELL, M.A., PH.D., F.INST.P., East African Agriculture and Forestry
Research Organisation, P.O. Box 21, Kikuyu, Kenya
R. K. SCHOFIELD, D.SC., F.INST.P., Department of Agriculture, Oxford
F. YATES, SC.D., F.R.S., Rothamsted Experimental Station, Harpenden

VOLUME LIV 1960

CAMBRIDGE
AT THE UNIVERSITY PRESS
1960

*Printed in Great Britain at the University Press, Cambridge
(Brooke Crutchley, University Printer)
and published by the Cambridge University Press
Bentley House, 200 Euston Road, London, N.W. 1
American Branch : 32 East 57th Street, New York 22, N.Y.
Agent in Canada : The Macmillan Company of Canada Limited*

CONTENTS

PART 1 (FEBRUARY 1960)

	PAGE
POMEROY, R. W. Infertility and neonatal mortality in the sow. I. Lifetime performance and reasons for disposal of sows. (With Six Text-figures)	1
POMEROY, R. W. Infertility and neonatal mortality in the sow. II. Experimental observation on sterility. (With Plates 1 to 7)	18
POMEROY, R. W. Infertility and neonatal mortality in the sow. III. Neonatal mortality and foetal development. (With Plate 8 and Nine Text-figures)	31
POMEROY, R. W. Infertility and neonatal mortality in the sow. IV. Further observations and conclusions. (With One Text-figure)	57
TIENHOVEN, A. VAN. The metabolism of fowl sperm in different diluents. (With One Text-figure)	67
LUCAS, I. A. M., McDONALD, I. and CALDER, A. F. C. Some further observations upon the effects of varying the plane of feeding for pigs between weaning and bacon weight. (With Seven Text-figures)	81
ROBERTSON, ALAN. The progeny testing of dairy bulls—a comparison of tests on father and son	100
WILSON, P. N. The effect of plane of nutrition on the growth and development of the East African dwarf goat. III. The effect of plane of nutrition and sex on the carcass composition of the kid at two stages of growth, 16 lb. weight and 30 lb. weight	105
JENKINS, N. K. and TYLER, C. A critical study of the failure of a long-term calcium and phosphorus balance experiment with laying hens	131
WARDROP, I. D. and COOMBE, J. B. The post-natal growth of the visceral organs of the lamb. I. The growth of the visceral organs of the grazing lamb from birth to sixteen weeks of age. (With Two Text-figures).	140

PART 2 (APRIL 1960)

GATHERUM, D. P., HARRINGTON, G. and POMEROY, R. W. Visual judgements of quality in meat. II. A simplification of the assessment of the proportion of lean to fat in bacon. (With Three Text-figures)	145
REID, D. and MACLUSKY, D. S. Studies on the cutting management of grass-clover swards. II. The effects of close cutting with either a gang mower or a reciprocating-knife mower on the yields from an established grass-clover sward	158
JAKOBSEN, K. FRIIS and MANN, T. Biochemical appraisal of a milk diluent for semen. (With Three Text-figures)	166
HAFEZ, E. S. E. Nutrition in relation to reproduction in sows. (With Five Text-figures)	170

	PAGE
CHARLES, ALLEN H. Establishment studies. I. The effect on spring oats of undersowing with a one-year ley. (With One Text-figure)	179
JONES, D. J. C. The effect of sulphate of ammonia applications on the sulphur content of various grass and clover mixtures. (With Four Text-figures)	188
SIMPSON, J. The age of queen honeybees and the tendency of their colonies to swarm	195
HUNGATE, R. E., PHILLIPS, G. D., HUNGATE, D. P. and MACGREGOR, A. A comparison of the rumen fermentation in European and zebu cattle	196
BENZIE, D., BOYNE, A. W., DALGARNO, A. C., DUCKWORTH, J., HILL, R. and WALKER, D. M. Studies of the skeleton of the sheep. IV. The effects and interactions of dietary supplements of calcium, phosphorus, cod-liver oil and energy, as starch, on the skeleton of growing Blackface wethers. (With Plates 9 and 10 and Seven Text-figures)	202
PATTERSON, H. D. An experiment on the effects of straw ploughed in or composted on a three-course rotation of crops	222
PHILLIPS, G. D. The relationship between water and food intakes of European and zebu type steers	231
ROLLINSON, D. H. L. and BREDON, R. M. Factors causing alterations of the level of inorganic phosphorus in the blood of zebu cattle. (With Three Text-figures)	235
FREER, M. The utilization of irrigated pastures by dairy cows. II. The effect of stocking rate (With Five Text-figures)	243
COWLISHAW, S. J. and ALDER, F. E. The grazing preference of cattle and sheep	257
EVANS, R. E. The effect of adding lysine and methionine to the diet of pigs kept on low-protein vegetable foods	266
BRAUDE, R., TOWNSEND, M. JILL and ROWELL, J. G. A comparison of meal and pelleted forms of creep feed for suckling pigs	274
OSBURN, D. F. and WILSON, P. N. Effects of different patterns of allocation of a restricted quantity of food upon the growth and development of cockerels. (With Two Text-figures)	278

PART 3 (JUNE 1960)

HOLMES, J. C., GILL, W. D. and RODGER, J. A. B. The effects of rates and time of application of nitrogenous fertilizer on barley in south-east Scotland	292
DUIJN, C. VAN, JNR. and RIKMENSPOEL, R. The mean velocity and velocity distributions of normal bull spermatozoa at different hydrogen-ion concentrations, derived from photoelectric measurements. (With Fifteen Text-figures)	300
LEWIS, A. H., PROCTOR, THE LATE JOHN and HOOD, A. E. M. A comparison of ley and arable farming systems	310
ISLAM, M. A. and CHOUDHURY, A. A. Distribution of iron, manganese and phosphorus in the paddy soil profile. (With Two Text-figures)	318

Contents

v

PAGE

ASHTON, G. C. β -Globulin polymorphism and economic factors in dairy cattle. (With Plate 11)	321
MAJUMDAR, B. N. Studies on goat nutrition. I. Minimum protein requirement of goats for maintenance—endogenous urinary nitrogen and metabolic faecal nitrogen excretion studies	329
MAJUMDAR, B. N. Studies on goat nutrition. II. Digestible protein requirements for maintenance from balance studies	335
FRIEND, M. T. and BIRCH, H. F. Phosphate responses in relation to soil tests and organic phosphorus	341
ASHDOWN, R. R. Development of penis and sheath in the bull calf. (With Plate 12 and Three Text-figures)	348
COOMBE, J. B., WARDROP, I. D. and TRIBE, D. E. A study of milk production of the grazing ewe, with emphasis on the experimental technique employed. (With One Text-figure)	353
THOMAS, GWEN J. Metabolism of the soluble carbohydrates of grasses in the rumen of the sheep. (With Six Text-figures)	360
HURWITZ, S. and GRIMINGER, P. Observations on the calcium balance of laying hens. (With Five Text-figures)	373
DICKINSON, A. G. Some genetic implications of maternal effects—an hypothesis of mammalian growth. (With Five Text-figures)	378
MULLICK, D. N. Effect of humidity and exposure to sun on the pulse rate, respiration rate, rectal temperature and haemoglobin level in different sexes of cattle and buffalo. (With One Text-figure)	391
ADAMS, S. N. The value of calcium nitrate and urea for sugar beet, and the effect of late nitrogenous top dressings	395
RIKMENSPOEL, R. Measurements of the 'motility' of bull sperm cells under various conditions. (With Eleven Text-figures)	399
EVANS, L. T. The influence of temperature on flowering in species of <i>Lolium</i> and in <i>Poa pratensis</i> . (With Eight Text-figures)	410
PHILLIPS, G. D., HUNGATE, R. E., MACGREGOR, A. and HUNGATE, D. P. Experiments on rumen retention time, fermentation rate and dry-matter digestibility in zebu and European-type cattle on a grass hay ration	417
JOHNSON, H. D. and RAGSDALE, A. C. The effect of rising environmental temperatures (35°–95° F.) on thyroid ¹³¹ I release rate of Holstein, Brown Swiss and Jersey heifers. (With Plates 13 and 14 and Five Text-figures)	421

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 techniques.

Vol. XXVIII. No. 109 CONTENTS

January 1960

D. STEPHENS: Fertilizer Trials on Peasant Farms in Ghana

G. A. R. KAMAR: Studies on Fowl Sperm. I and II

D. L. JENNINGS: Observations on Virus Diseases of Cassava in Resistant and Susceptible Varieties. I

A. WAHHAB and R. AHMAD: Manuring of Cotton in West Pakistan. II

D. L. BROWN: The Nguni Breed of Cattle. II

S. K. DUTTA and K. N. SHARMA: Manuring of Green Crops used in Tea Culture

C. J. PICCOTT: The Effect of Fertilizers on the Yield and Quality of Groundnuts in Sierra Leone

A. WAHHAB and R. AHMAD: Manuring of Cotton in West Pakistan. III

A. O. TANTAWY and I. A. AHMED: Studies in Egyptian Baladi Goats. I

Royal 8vo. 14s. net. Annual subscription (four numbers) 45s. post free.

OXFORD UNIVERSITY PRESS
AMEN HOUSE, LONDON, E.C.4

CONTENTS

PAGE

HOLMES, J. C., GILL, W. D. and RODGER, J. A. B. The effects of rates and time of application of nitrogenous fertilizer on barley in south-east Scotland	291
DUIJN, C. VAN, JNR. and RIKMENSPOEL, R. The mean velocity and velocity distributions of normal bull spermatozoa at different hydrogen-ion concentrations, derived from photo-electric measurements. (With Fifteen Text-figures)	300
LEWIS, A. H., PROCTER, THE LATE JOHN and HOOD, A. E. M. A comparison of ley and arable farming systems	310
ISLAM, M. A. and CHOUDHURY, A. A. Distribution of iron, manganese and phosphorus in the paddy soil profile. (With Two Text-figures)	318
ASHTON, G. C. β -Globulin polymorphism and economic factors in dairy cattle. (With Plate 11)	321
MAJUMDAR, B. N. Studies on goat nutrition. I. Minimum protein requirement of goats for maintenance—endogenous urinary nitrogen and metabolic faecal nitrogen excretion studies	329
MAJUMDAR, B. N. Studies on goat nutrition. II. Digestible protein requirements for maintenance from balance studies	335
FRIEND, M. T. and BIRCH, H. F. Phosphate responses in relation to soil tests and organic phosphorus	341
ASHDOWN, R. R. Development of penis and sheath in the bull calf. (With Plate 12 and Three Text-figures)	348
COOMBE, J. B., WARDROP, I. D. and TRIBE, D. E. A study of milk production of the grazing ewe, with emphasis on the experimental technique employed. (With One Text-figure)	353
THOMAS, GWEN J. Metabolism of the soluble carbohydrates of grasses in the rumen of the sheep. (With Six Text-figures)	360
HURWITZ, S. and GRIMINGER, P. Observations on the calcium balance of laying hens. (With Five Text-figures)	373
DICKINSON, A. G. Some genetic implications of maternal effects—an hypothesis of mammalian growth. (With Five Text-figures)	378
MULLICK, D. N. Effect of humidity and exposure to sun on the pulse rate, respiration rate, rectal temperature and haemoglobin level in different sexes of cattle and buffalo. (With One Text-figure)	391
ADAMS, S. N. The value of calcium nitrate and urea for sugar beet, and the effect of late nitrogenous top dressings	395
RIKMENSPOEL, R. Measurements of the 'motility' of bull sperm cells under various conditions. (With Eleven Text-figures)	399
EVANS, L. T. The influence of temperature on flowering in species of <i>Lolium</i> and in <i>Poa pratensis</i> . (With Eight Text-figures)	410
PHILLIPS, G. D., HUNGATE, R. E., MACGREGOR, A. and HUNGATE, D. P. Experiments on rumen retention time, fermentation rate and dry-matter digestibility in zebu and European-type cattle on a grass hay ration	417
JOHNSON, H. D. and RAGSDALE, A. C. The effect of rising environmental temperatures (35°–95° F.) on thyroid ¹³¹ I release rate of Holstein, Brown Swiss and Jersey heifers. (With Plates 13 and 14 and Five Text-figures)	421

The Journal of Agricultural Science is issued every other month in parts of about 136 pages with plates and figures, three parts constituting a volume. Two volumes yearly.

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 SIR JOHN 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 page 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 25s. 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 \$11.50 per volume; single number \$4.25. Enquiries should be addressed to the Cambridge University Press, American Branch, 32 East 57th Street, New York 22, N.Y.