ANIMAL PRODUCTION



JOURNAL OF THE BRITISH SOCIETY OF ANIMAL PRODUCTION

MAY 1968

VOL. 10 PART 2

OLIVER & BOYD LTD EDINBURGH AND LONDON

https://doi.org/10.1017/S0003356100026052 Published online by Cambridge University Press

INFORMATION FOR CONTRIBUTORS TO ANIMAL PRODUCTION

Animal Production publishes papers on original research provided that they have not been and, with the exception of authors' summaries, will not be published elsewhere without the Editors' written permission. Authors' summaries can be reproduced if full acknowledgement of the source is made.

Contributions may be in the field of animal production, or in any related scientific field. Reports on techniques will be published only as appendices to scientific papers. Results of research which do not warrant a comprehensive presentation may be submitted for consideration as *Notes*. Notes are not intended for the publication of interim results. They should not exceed 2000 words or the equivalent inclusive of tables and illustrations.

Manuscripts should be typewritten in double spacing with wide margins. Each page and the lines on each page should be numbered. *Two* copies of the typescript (one of illustrations) should be sent to

> Dr. Gerald Wiener, Animal Production, A.R.C. Animal Breeding Research Organisation, West Mains Road, Edinburgh 9.

Manuscripts are not returned with proofs; authors should therefore retain copies.

For guidance to the general style which should be adopted in the writing and presentation of papers authors are referred to *General Notes on the Presentation of Scientific Papers* (2nd revised ed., 1965) published by the Royal Society, London (price 5s.). Points of detail applying particularly to *Animal Production* are given below.

Illustrations. The same material should not normally be presented in tables and figures. Legends should be typed on a separate sheet.

- (a) Diagrams should be drawn in Indian ink, about twice the size of the finished block, on Bristol board or stout tracing paper. Photographed diagrams are also accepted. Lettering inside the framework of the diagram should be inserted in Indian ink. Marginal lettering may, if preferred, be inserted lightly in pencil.
- (b) Photographs intended for half-tone reproduction should be on glossy paper. They will be accepted only if found necessary by the Editors.
- (c) Colour plates are unlikely to be accepted unless authors bear the cost.

[Continued on inside back cover

Single number, 25s. or \$4.00 net.

Annual subscription, 90s. or \$14.00

Front cover centrepiece : Minoan bull-leaping sport shown in mural paintings in the palace of Knossos, Crete (after Evans). The piebald coat is thought (Zeuner, 1963) to indicate domestication of the breed.

BRITISH SOCIETY OF ANIMAL PRODUCTION

* * *

Previous numbers of 'ANIMAL PRODUCTION' are available :---

1959	Volume 1 in 2 parts	30s. or \$5.00
1960	Volume 2 in 2 parts	30s. or \$5.00
1961	Volume 3 in 3 parts	45s. or \$7.50
1962	Volume 4 in 3 parts	45s. or \$7.50
1963	Volume 5 in 3 parts	45s. or \$7.50
1964	Volume 6 in 3 parts	45s. or \$7.50
1965	Volume 7 in 3 parts	65s. or \$11.00
1966	Volume 8 in 3 parts	65s. or \$11.00
1967	Volume 9 in 4 parts	90s. or \$14.00
(Single parts 25s. or \$4.00)		or \$4.00)

* * *

Earlier publications of the Society, from 1944-58, are also available. Orders and enquiries should be addressed to:

> Oliver & Boyd Ltd. Tweeddale Court 14 High Street Edinburgh, 1

> > * * *

Information about the activities of the British Society of Animal Production and details of membership may be obtained from:

> The Honorary Secretary British Society of Animal Production West of Scotland Agricultural College Auchincruive

> > Ayr

The British Veterinary Journal A monthly review of veterinary science

Editor: J. A. Laing

The March 1968 issue includes:

- K C. Sellers, G. F. Smith and P. D. P. Wood : An Investigation into Calf Mortality in the First Eight Weeks of Life in England and Wales.
- W. M. Goodchild and J. F. Tucker : Salmonellae in British Wild Birds and their Transfer to Domestic Fowl.
- J. F. Tucker and R. F. Gordon : The Incidence of Salmonellae in Poultry Packing Stations.
- G. W. Osbaldiston: The Effect of Air Temperature on Food Consumption of Chickens.
- G. Froyd : Field Trials with Oxyclozanide.
- T. J. McClure : Hypoglycaemia, An Apparent Cause of Infertility in Lactating Cows.

Annual Subscription 120s

Available from

Baillière, Tindall & Cassell 7 & 8 Henrietta Street, London W.C.2

I.C.A.R. PUBLICATIONS

ANATOMY OF THE OX WITH COMPARATIVE NOTES ON THE HORSE, DOG AND FOWL

760 pp. (7¹/₂"×10"). 1964. 18 plates. 281 figs. Price 120s. (\$16.00)

VETERINARY ENTOMOLOGY AND ACAROLOGY FOR INDIA By Sen and FLETCHER 834 pp. (6¹/₄ × 9¹/₄). 1962. 232 illustrations. 50 plates. Price 45s. (\$6.00)

VETERINARY BIOLOGICAL PRODUCTS AND THEIR USE

By SEETHARAMAN and K. C. SINGH 117 pp. (6[‡] × 9[‡]). 1963. Price 18s. (\$3.00)

BIOLOGICAL FACTORS AFFECTING HIDES AND SKINS IN INDIA By B. M. Soni

64 pp. $(6\frac{1}{2}" \times 9\frac{1}{2}")$. 1960. 36 illustrations. Price 12s. (\$1.75)

Copies available with

The Business Manager Indian Council of Agricultural Research Krishi Bhavan, New Delhi, INDIA

Do YOU know the developments taking place in the world's dairying centres?

DAIRY SCIENCE ABSTRACTS

compiled from world literature by the

COMMONWEALTH BUREAU OF DAIRY SCIENCE AND TECHNOLOGY SHINFIELD · READING · ENGLAND

brings that knowledge to the dairy scientist and technologist. Every month in its review articles and its abstracts will be found information on research and development reported in all branches of dairying throughout the world.

Annual subscription: 110s. to subscribers in the Commonwealth and the Republic of Ireland whose governments contribute to the Commonwealth Agricultural Bureaux.

210s. to subscribers in non-contributing countries.

Order it through your bookseller or direct from

COMMONWEALTH AGRICULTURAL BUREAUX **CENTRAL SALES BRANCH** FARNHAM ROYAL · SLOUGH · ENGLAND

BRITISH POULTRY SCIENCE

CONTENTS OF VOLUME 9, PART 1, JANUARY 1968

- LUCAS, J. M. S., OWERS, A. C. and SCOTT, J. F. Dimetridazole. VI. Turkey growth studies.
- VERMEERSCH, G. and VANSCHOUBROEK, F. The quantification of the effect of increasing levels of various fats on body weight gain, efficiency of food conversion and food intake of growing chicks.
- VAN TIJEN, W. F. On the relationship between the height of the thick albumen and the weight of eggs.
- BIGGS, P. M., THORPE, R. J. and PAYNE, L. N. Studies on genetic resistance to Marek's disease in the domestic chicken.
- WOODHAM, A. A. A chick growth test for the evaluation of protein quality in cereal-based diets. I. Development of the method.
 WOODHAM, A. A. and MCDONALD, I. A chick growth test for the evaluation of protein quality in cereal-based-diets. 2. Comparison of the total protein efficiency method with gross protein value method.
- Will gloss protein value include:
 LONG, P. L. The effect of breed of chickens on resistance to *Eimeria* infections.
 WARING, J. J., ADDISON, R. F. and BROWN, W. O. A comparative study of energy utilisation by the laying hen from diets containing a high proportion of fat and diets made up mainly from carbohydrate sources.

VINCE, MARGARET A. Effect of rate of stimulation on hatching time in Japanese quail.

DAVIDSON, J., HEPBURN, W. R., MATHESON, J. and PULLAR, J. D. Comparisons of heat loss from young cockerels by direct measurement and by indirect assessment involving body analysis.

BOARD, PATRICIA A. and BOARD, R. G. A diagnostic key for identifying organisms recovered from rotten eggs.

This Journal is published quarterly in January, April, July and October. The annual subscription is £5 and in the U.S.A. \$17.00, single parts 27s. 6d. and in the U.S.A. \$4.50. Orders and subscriptions may be sent to any bookseller or direct to the publishers:

OLIVER AND BOYD LTD Tweeddale Court, 14 High Street, Edinburgh 1 .

ANIMAL BREEDING ABSTRACTS

is such an invaluable guide to the latest literature on livestock breeding and production that we can hardly believe you have not heard of it (110s. annually, or 210s. if you live outside the British Commonwealth or the Republic of Ireland) **BUT** do you know about our

ANNOTATED BIBLIOGRAPHIES

Number Subject		Period covered	Number of References	Price
59	Effect of light on reproductive traits of sheep in the tropics	1950-67	11	6s.
60	A survey of the factors influencing litter size and weight in pigs	19 52- 67	87	24s.
61	Partial castration (Baiburtcjan's method)	196 2- 67	42	12s.
62	A.I. in the pig: recent references on technique includ- ing equipment and storage	1963-67	27	6s.
63	Cattle breeds in South America	1947-65	48	12s.
64	Pig production in the tropics	19 52- 66	65	18s.
65	A.I. in beef cattle	1962-67	32	9s.
6 6	The relation between non-return conception rate and and calving rate	1950-66	13	6s.
67	Simmental cattle	1947-67	47	12s.
68	Double muscling in beef cattle	1960-66	13	6s.
69	Genotype-environment interaction in cattle	1961-67	41	12s.
70	N'Dama cattle	1954-66	20	6s.
71	Genetic improvement, selection efficiency and estima- tion of genetic change	1939-67	200	42s.
72	Comparison between Australian Illawarra Shorthorn performance and other breeds	195 2- 66	8	6s.
73	Milk production in beef breeds	1950-65	34	9s.
74	Mink breeding and production	1952-67	112	30s.
75	Crossbreeding with Brahman cattle for beef	1954-67	75	21s.
76	The performance of Dorset Horn and Wiltshire Horn sheep in Britain and in the tropics	195 2- 66	16	6s.
77	Computer simulation of genetic systems	1961-67	42	12s.

These are duplicates of bibliographies prepared on request at the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh. In addition to the full title reference, the abstract published in *Animal Breeding Abstracts* is reproduced. They can be obtained on application to the Director of the Bureau, The King's Buildings, West Mains Road, Edinburgh, 9. The prices quoted include postage by ordinary mail, and the remittance should be sent with the order *unless you want it posted by air mail*. If the material is to be sent by air mail, do not send money with your request. You will receive an invoice which includes air mail postage.

EXPERIMENTAL AGRICULTURE

EXPERIMENTAL AGRICULTURE is concerned with the application of experimental work to the whole range of agricultural problems in tropical countries.

Volume 4, Number 2, April 1968

- P. G. C. DODSON. Effects of spacing, nitrogen and hormone treatment on pineapple in Swaziland.
- R. D. SINGH and B. N. CHATTERJEE. Growth analysis of perennial grasses in tropical India: I. Herbage growth in pure grass swards.
- R. D. SINGH and B. N. CHATTERJEE. Growth analysis of perennial grasses in tropical India: II. Herbage growth in mixed grass/legume swards.

BIYI AFONJA. Analysis of a uniformity trial on cassava.

D. HOPKINSON. Experiments on mulching sisal with black polythene in Tanganyika.

- E. A. K. EL SAEED. Agronomic aspects of broad beans (Vicia faba L.) grown in the Sudan.
- K. SANTHIRASEGARAM. Studies on the nutrient status of some coconut soils in Ceylon: 10. Minor soil series and conditions in the Chilaw district.
- P. NEWBOULD, E. R. MERCER and P. M. LAY. Estimation of changes in the water status of soils under field conditions from the attenuation of β radiation by water held in absorbent nylon pads.
- D. A. HOLLAND. The component analysis approach to the interpretation of plant analysis data from groundnuts and sugar cane.

35s. net (\$5.00). Annual subscription £5 net (\$18.00) for four issues.

Copies may be ordered from your bookseller or from

CAMBRIDGE UNIVERSITY PRESS BENTLEY HOUSE, 200 EUSTON ROAD LONDON, N.W.1

THE JOURNAL OF AGRICULTURAL SCIENCE

VOL. 70 PART 2 APRIL 1968

ENGLAND, F. Non-sward densities for the assessment of yield in Italian ryegrass. II. Convenient plot and block size and shape.

block size and shape.
AL-AZZAWI, I. I., GHONEIM, K. E., EL-HAIDARY, H. and KAZZAL, N. T. Effect of feeding dried beet pulp on growth rate of Awassi sheep.
DONEY, J. M. and EVANS, C. C. The influence of season and nutrition on the sulphur content of wool from Merino and Cheviot sheep.
OSMAN, A. H. and RIZGALLA, Y. Normal growth and development up to one year of age of Sudanese cattle with special reference to the influence of sea and sire.
SHARPE, P. R. and DENT, J. B. The determination and economic analysis of relationships between plant provided in the subject of the influence of sea and sire.

population and yield of main crop potatoes. MATTINGLY, G. E. G. and PENNY, A. Evaluation of phosphate fertilizers. I. Immediate value of dicalcium phosphate, nitrophosphates, Gafsa rock phosphate, basic slag and potassium metaphosphate for barley

phosphate, nitrophosphates, Gafsa rock phosphate, basic slag and potassium metaphosphate for barley and ryegrass.
MATTINGLY, G. E. G. Evaluation of phosphate fertilizers. II. Residual value of nitrophosphates, Gafsa rock phosphate, basic slag and potassium metaphosphate for potatoes, barley and swedes grown in rotation, with special reference to changes in soil phosphorus status.
GILCHRIST, F. M. C., POTGETER, E. and VOSS, J. B. N. The biuretolytic activity of the ruminal flora of sheep fed practical rations containing biuret.
DRANE, HILARY M. and SABA, N. Oestrongenic activity in legumes.
NATH, K., SAHAI, K. and KEHAR, N. D. A note on the effect of lime and calcium carbonate supplementation on the nutritive value of paddy (*Oryza sativo*) straw.
FORBES, J. M. The physical relationships of the abdominal organs in the pregnant ewe.
SCANLON, P., SREENAN, J. and GORDON, I. Hormonal induction of superovulation in cattle.
SREENAN, J., SCANLON, P. and GORDON, I. Culture of fertilized cattle eggs.
ROBINSON, J. J., FOSTER, W. H. and FORBES, T. J. An assessment of the variation in milk yield of ewes determined by the lamb-suckling techniques.

 Normson, J. J., POSTER, W. H. and TORBE, T. J. An assessment of the variation in mink yield of ewes determined by the lamb-suckling techniques.
 WOLTON, K. MARGARET, BROCKMAN, J. S., BROUGH, D. W. T. and SHAW, P. G. The effect of nitrogen, phos-phate and potash fertilizers on three grass species.
 BUTTERWORTH, M. H., HOUGHTON, T. R., MACARTNEY, J. C., PRIOR, A. J., MIDDLEMISS, C. P. and EDMOND, D. E. Some observations on the lactation of Blackhead ewes and the growth of lambs: the composition and wield of an effective section. yield of milk.

SCAFF, M. A. Maize fertilizer experiments in Western Tanzania.
OWEN, B. J., MILLER, E. L. and BRIDGE, P. S. A study of the voluntary intake of food and water and the lactation performance of cows given diets of varying roughage content ad libitum.

40s. net (\$6.00). Annual subscription £9 net (\$32.00) for six issues

Cambridge University Press, Bentley House, 200 Euston Road, London, N.W.1

THE BRITISH JOURNAL OF NUTRITION Volume 22, Number 1. March 1968 I. E. DREOSTI and G. V. QUICKE. Blood copper and copper status. V. R. YOUNG and N. S. SCRIMSHAW. Endogenous nitrogen metabolism and plasma free amino acids in young adults given a 'protein-free' diet. J. M. HARRIES, A. W. HUBBARD, F. E. ALDER, M. KAY and D. R. WILLIAMS. Studies on the composition of food—3. J. M. FORBES. The water intake of ewes R. B. HARRAND and R. L. HARTLES. Effect of vitamin D in rats given diets with different mineral content but the same low Ca:P ratio. R. A. LENG, J. L. CORBETT and D. J. BRETT. Rates of production of volatile fatty acids in the rumen of grazing sheep and their relation to ruminal concentrations. G. J. JUDSON, ELIZABETH ANDERSON, J. R. LUICK and R. A. LENG. Contribution of propionate to glucose synthesis in sheep given diets of different grain content. P. A. THORNTON. Effects of ascorbic acid on the skeletal response of chicks to vitamin D deficiency. ZINA D. HOSKING. Effect of level of dietary calcium on the skeleton of the rat. J. BUNYAN, J. GREEN, ELSPETH A. MURRELL, A. T. DIPLOCK and M. A. CAWTHORNE. On the postulated peroxidation of unsaturated lipids in the tissues of vitamin E-deficient rats. J. F. ADAMS, ELIZABETH H. KENNEDY, J. THOMSON and J. WILLIAMSON. Effect of acid peptic digestion on free and tissue-bound cobalamins. T. S. NEUDOERFFER and C. H. LEA. Dietary fat and amounts and proportions of the individual lipids in turkey muscle. R. FERRANDO, NICOLE HENRY and P. LARVOR. Protein quality of meat meals assayed with rats and with Streptococcus zymogenes. M. A. CAWTHORNE, J. BUNYAN, A. T. DIPLOCK, ELSPETH A. MURRELL and J. GREEN. Relationship between vitamin A and vitamin E in the rat. 45s. net (\$7.50) plus postage. Annual subscription £9 net (\$32.00) includes two issues of The Proceedings of the Nutrition Society. Cambridge University Press, Bentley House, 200 Euston Road, London, N.W.1

Journal of Dairy Research

VOLUME 35, NUMBER 2. JUNE 1968

Errors in fat testing. A. K. R. McDowell.

- Fat testing with the Milko-tester. A. K. R. McDowell.
- Biuret and urea for milking cows. R. WAITE, M. E. CASTLE, J. N. WATSON and A. D. DRYSDALE.
- Rumen fluid composition and NPN diets. R. WAITE and AGNES G. WILSON.
- Detection of abnormal milk by electrical means. G. R. GREATRIX, J. C. QUAYLE and R. A. COOMBE.
- Dietary fat and milk fat secretion. W. STEELE and J. H. MOORE.
- Neutral volatiles in Cheddar cheese. W. A. McGugan, Shirlie G. Howsam, J. A. Elliott and D. B. Emmons.
- Soiling of milking equipment. BRANCA BACIĆ, CHRISTINA M. COUSINS and L. F. L. CLEGG.

Removal of fission products from milk—I. R. F. GLASCOCK, H. S. HALL, S. F. SUFFOLK and D. T. W. BRYANT.

Removal of fission products from milk—II. R. F. GLASCOCK and D. T. W. BRYANT. Dry period infection and milk production. A. SMITH, F. H. DODD and F. K. NEAVE. Sampling and milk fat determination. M. G. O'KEEFFE.

Electronic counting of cells in milk. L. W. PHIPPS.

Vacuum in teatcup liner. C. C. THIEL, P. A. CLOUGH, D. R. WESTGARTH and D. N. AKAM.

Review. Deposits from milk on heated surfaces. H. BURTON.

30s. net (\$5.00). Annual subscription 80s. net (\$13.50) for three issues

Cambridge University Press, Bentley House, 200 Euston Road, London, N.W.1.

COMMONWEALTH BUREAU OF ANIMAL NUTRITION

The Bureau announces the first three of a new series of Annotated Bibliographies in which abstracts and titles of papers on specific topics will be brought together. The period covered will usually be from 1950 to the most recent abstracts available in *Nutrition Abstracts and Reviews*.

Annotated Bibliographies now obtainable are:

- AB No. 1. Nutrient requirements of the mouse. 62 references. Price 12s.
- AB No. 2. Metabolism of steam-volatile fatty acids in cattle and sheep. 400 references. Price 80s.
- AB No. 3. Nutritive value of sugar cane by-products for ruminants. 215 references. Price 43s.

Obtainable from

Commonwealth Bureau of Animal Nutrition, Bucksburn, Aberdeen, AB2 9SB, Scotland

vii

THE JOURNAL OF THE AUSTRALIAN INSTITUTE OF AGRICULTURAL SCIENCE

CONTENTS-VOL. 33, No. 4. DECEMBER 1967 INCLUDE

Articles

The Climate of the Sub-coastal Plains of Northern Australia: A Comparison with Those of Other Rice-growing Areas, by P. C. OWEN Some Aspects of the Effects of Grazing on the Nutrition of Pastures, by N. J. BARROW

Technical Notes

A Factor Limiting the Ruminant's Voluntary Consumption of Silage, by J. H. TERNOUTH Apomixis in Brachiaria decumbers Stapf., by A. J. PRITCHARD The Maintenance of Strain Purity in the Setaria sphacelata Complex, by J. B. HACKER Castration of Adult Rams with Rubber Rings as an Aid to Flock Management, by P. A. CALDER and C. H. S. DOLLING Yield Increases of Wheat Following the Control of Skeleton Weed with Picloram, by V. MOLNAR, T. W. DONALDSON and W. T. PARSONS

Talks

Insect Resistance to Insecticides, by G. H. S. HOOPER The Significance of the Annemus Weevil in Tropical Legume-based Pastures, by P. T. MEARS Recent Developments in Legume Bacteriology, by D. O. NORRIS Recent Developments in Plant Pathology, by B. L. OXENHAM Fire Behaviour, by A. G. MCARTHUR Development of Knowledge of Plant Viruses, by F. BAWDEN Queensland Development, by R. PATTERSON The Safe Use of Chemicals in Agriculture, by J. BENSTEAD The Victoria Institute of Colleges, by P. LAW

News Items

Institute Affairs

Enquiries should be addressed to the

Business Manager, 226 Clarendon Street, East Melbourne, C.2, Victoria, Australia

Index Veterinarius

A COMPLETE BIBLIOGRAPHY OF VETERINARY LITERATURE

This subject and author index of current literature on veterinary and related sciences is produced by the Commonwealth Bureau of Animal Health and was first published in 1933. It is issued quarterly and each year about 15,000 references are listed.

For compilation of the Index 700 periodicals in 22 languages are searched and coverage embraces the whole world.

Annual subscription is 300s. (\$39) (reduced rate to residents in British Commonwealth or Republic of Ireland—140s.). Orders may be sent to the Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Slough, Bucks.