ANIMAL PRODUCTION

JOURNAL OF
THE BRITISH SOCIETY OF ANIMAL PRODUCTION

Edited by

GERALD WIENER
J. F. D. GREENHALGH
G. HARRINGTON
I. L. MASON
L. E. MOUNT

VOLUME 10 1968

OLIVER & BOYD LTD. EDINBURGH AND LONDON

PRINTED AND PUBLISHED IN GREAT BRITAIN BY OLIVER AND BOYD LTD., EDINBURGH

CONTENTS OF VOLUME 10

(LISTED ALPHABETICALLY BY AUTHOR)

	PAGE
Anderson, B. Bech, see Hinks, C. J. M.	IAGE
Andrews, R. P., see Kay, M.	
Bowers, H. B., see Kay, M.	
BOWMAN, J. C., MARSHALL, J. E., and BROADBENT, J. S. Genetic parameters of carcass quality in Down cross sheep.	183
Braend, M., and Khanna, N. D. Haemoglobin and transferrin types of some West African cattle	129
Broadbent, J. S., see Bowman, J. C., see also Watson, J. H.	
Brown, W., see Winfield, C. J.	
Burt, A. W. A. A note on the effect of giving milk substitute only once a day to early-weaned calves	113
Campbell, J. B., see Troelsen, J. E.	
CASADY, R. B., see Grunder, A. A.	
Cassie, Linda, see Robertson, I. S.	
CHAMBERLAIN, A. G., and LUCAS, I. A. M. The nutritive value of separated milk for pigs. I. A comparison of two diets containing separated milk with a standard all-meal diet	1
Christensen, K. Relationship between milk composition and yield of milk, fat and protein in Red Danish cattle	445
Čobić, T. Castration experiments with Yugoslav Simmental cattle. I. The effect of castration on growth and live-weight gains	103
Cole, D. J. A., Duckworth, J.E., Holmes, W. and Cuthbertson, A. Factors affecting voluntary feed intake in pigs. 3. The effect of a period of feed restriction, nutrient density of the diet and sex on intake, performance and carcass characteristics	345
CRESSWELL, E., GILL, J. C., and FRASER, C. A note on the use of skim-milk in the feeding of store-lambs	117
CUTHBERTSON, A., and PEASE, A. H. R. The inter-relationships of various measurements, visual assessments and dissection results of pigs of 200 lb live weight	249
CUTHBERTSON, A. see also COLE, D. J. A.	
DAVIES, P. J. The effect of cereal and protein source on the energy intake and nitrogen balance of fattening lambs given all-concentrate diets	311
DAY, M., see WALKER, T.	
Donald, H. P., Read, J. L., and Russell, W. S. A comparative trial of crossbred ewes by Finnish Landrace and other sires	413
Donald, H. P., and Russell, W. S. Some aspects of fertility in purebred and crossbred dairy cattle	465
DONEY, J. M., see RUSSELL, A. J. F.	
DUCKWORTH, J. E., and HOLMES, W. Selection for carcass length in Large White pigs	359
DUCKWORTH, J. E., see also COLE, D. J. A.	
EL-SHAZLY, K., see IBRAHIM, E. A.	

iv CONTENTS

Every E. W. H. M. chymnosy D. M. and Longe C. A. The effects of level	PAGE
ELSLEY, F. W. H., MACPHERSON, R. M., and LODGE, G. A. The effects of level of feeding of sows during pregnancy. III. Body composition	149
Forbes, T. J., see Robinson, J. J.	
Fraser, C., see Cresswell, E.	
Freeman, G. H., see Rogerson, A.	
GALAL, E. SALAH, E. Estimates of genetic parameters of growth rate in sheep with reference to the method of estimation	1 0 9
GIVENS, R. L., see Morrison, S. R.	
Griffiths, J. G. Observations on neonatal changes of body temperature in Blackface lambs	319
GRUNDER, A. A., ROLLINS, W. C., STORMONT, C., and CASADY, R. B. A note on differential mortality rates in young rabbits of esterase phenotypes A, AB, and B	221
GUNN, R. G. A note on difficult birth in Scottish hill flocks	213
GUNN, R. G., see also RUSSEL, A. J. F.	
HALLIDAY, R. Serum γ -globulin levels in dead lambs from hill flocks	177
HALLIDAY, R., see also SLEE, J.	
HAMADA, M. K. O., see IBRAHIM, E. A.	
Hanrahan, T. J., and O'Grady, J. F. Copper supplementation of pig diets. The effect of protein level and zinc supplementation on the response to added copper	423
HINKS, C. J. M. The use of station and field tests for the improvement of milking performance in dairy cattle. I. Variation in milk yield and butterfat in test station records	93
HINKS, C. J. M. The use of station and field tests for the improvement of milking performance in dairy cattle. III. Breed differences in the yield of milk and butterfat from the fore and rear quarters of the udder	209
HINKS, C. J. M., and ANDERSEN, B. BECH. Phenotypic aspects of growth and carcass quality in veal calves	331
HINKS, C. J. M., NIELSEN, E. O., and NEIMANN-SØRENSEN, A. The use of station and field tests for the improvement of milking performance in dairy cattle. II. Milking rate and time as indicators of a cow's milking ability	201
HINTZ, H. F., see Morrison, S. R.	
HODGSON, J., see JACKSON, P.	
Holmes, C. W. Heat losses from young pigs at three environmental temperatures, measured in a direct calorimeter	135
HOLMES, W., see Cole, D. J. A., see also Duckworth, J. E.	
HOLZER, Z., see LEVY, D.	
IBRAHIM, E.A., EL-SHAZLY, K., KARAM, H.A., and HAMADA, M.K.O. A note on the effect of diethylstilboestrol on the performance of lambs	217
JACKSON, P., HODGSON, J., and ROOK, J. A. F. The voluntary intake of acetate by dairy cows given ammonium salts of short-chain fatty acids in their	
drinking water	473
JOBST, D., and WOOD, P. D. P. A note on the seasonal effect on the growth rate of Hereford cross Friesian male calves	491

CONTENTS	v
	T. CT

JORDAN, R. M., and MARTEN, G. C. A note on the management of grazing,	PAGI
non-lactating ewes	121
KARAM, H. A., see IBRAHIM, E. A.	
KAY, M., ANDREWS, R. P., MACLEOD, N. A., and WALKER, T. Urea and cereals as supplements for ruminants offered barley straw	171
KAY, M., Bowers, H. B., and McKiddle, G. The protein requirements of rapidly growing steers	37
KAY, M., see also MACLEOD, N. A.	
KHANNA, N. D., see BRAEND, M.	
KILKENNY, J. B. A note on estimates of the repeatability of weaning weight in beef cattle	483
LAMMING, G. E., see PICKARD, D. W., see also SWAN, H.	
LECCE, J. G., see PERRY, G. C.	
LEDGER, H. P., see ROGERSON, A.	
LEVY, D., HOLZER, Z., and VOLCANI, R. The effect of age and live weight on feed conversion and yield of saleable meat of intact Israeli Friesian male calves	325
LODGE, G. A., see Elsley, F. W. H.	
LUCAS, I. A. M., see CHAMBERLAIN, A. G., see also WINFIELD, C. J.	
MACDEARMID, A., see MACLEOD, N. A., see also WALKER, T.	
McDonald, I., see Walker, T.	
McKiddie, G., see Kay, M.	
MacLeod, N. A., MacDearmid, A., and Kay, M. A note on the performance of Friesian and Ayrshire calves fattened on a cereal diet	487
MACLEOD, N. A., see also KAY, M., see also WALKER, T. §	
MacPherson, R. H., see Elsley, F. W. H.	
Marshall, Janet E., Watson, J. H., and Slattery, A. Prediction of eyemuscle area from introscope measurements on carcasses of pigs of bacon weight	283
Marshall, Janet, see also Bowman, J. C.	
Marten, G. C., see Jordan, R. M.	
MILLER, G. R. Some responses of hill ewes and lambs to artificial shelter .	59
Morrison, S. R., Hintz, H. F., and Givens, R. L. A note on effect of exercise on behaviour and performance of confined swine	341
Neimann-Sørensen, A., see Hinks, C. J. M.	
Nielsen, E. O., see Hinks, C. J. M.	
O'CONNOR, L. K., WOOD, P. D. P., and SMITH, G. F. A note on the differences	
between geographical areas in the gestation length and birth weight of British Friesian calves	125
O'Grady, J. F., see Hanrahan, T. J.	
OWEN, J. B., and RIDGMAN, W. J. Further studies of the effect of dietary energy content on the voluntary intake of pigs	85
PAVER, H., see ROBERTSON, I. S.	
Pease, A. H. R., see Cuthbertson, A.	
Perry, G. C., and Lecce, J. G. The rearing of colostrum-deprived piglets.	433

vi CONTENTS

Provide D. W. and Language C. D. A. and all all all all all all all all all al	PAGE
PICKARD, D. W., and LAMMING, G. E. A note on the substitution of protein by non-protein nitrogen in beef rations	223
PRESTON, T. R., see WALKER, T., see also WILLIS, M. B.	
READ, J. L., see DONALD, H. P.	
RIDGMAN, W. J., see OWEN, J. B.	
ROBERTSON, I. S., PAVER, H., and CASSIE, LINDA. A note on the water balance of dairy cows drinking nutrient solutions	227
ROBINSON, J. J., and FORBES, T. J. The effect of protein intake during gestation on ewe and lamb performance	297
ROGERSON, A., LEDGER, H. P., and FREEMAN, G. H. Food intake and live-weight gain comparisons of <i>Bos indicus</i> and <i>Bos taurus</i> steers on a high plane of nutrition.	373
ROLLINS, W. C., see Grunder, A. A.	
ROOK, J. A. F., see Jackson, P.	
RUSSEL, A. J. F., GUNN, R. G., and DONEY, J. M. Components of weight loss in pregnant hill ewes during winter	43
Russel, A. J. F., Gunn, R. G., Skedd, E., and Doney, J. M. Relationships between chemical and physical composition of Scottish Blackface ewes.	53
RUSSELL, W. S., see DONALD, H. P.	
SKEDD, E., see RUSSELL, A. J. F.	
SLATTERY, A., see MARSHALL, JANET E.	
SLEE, J. Body temperature and vasomotor responses in Scottish Blackface and Tasmanian Merino sheep subjected to slow cooling	265
SLEE, J., and HALLIDAY, R. Some effects of cold exposure, nutrition and experimental handling on serum-free fatty-acid levels in sheep	67
SLEE, J., see also Sykes, A. R.	
SMITH, G. F., see O'CONNOR, L. K.	
STORMONT, C., see Grunder, A. A.	
SWAN, H., and LAMMING, G. E. Studies on the nutrition of ruminants. 3. The substitution of soya bean meal by urea in diets containing ground roughage and cereal	193
SYKES, A. R., and SLEE, J. Acclimatization of Scottish Blackface sheep to cold. 2. Skin temperature, heart rate, respiration rate, shivering intensity and skinfold thickness	17
TAYLOR, St. C. S. Time taken to mature in relation to mature weight for sexes, strains and species of domesticated mammals and birds	157
TAYLOR, St. C. S., and Young, G. B. Equilibrium weight in relation to food intake and genotype in twin cattle	393
TROELSEN, J. E., and CAMPBELL, J. B. Voluntary consumption of forage by sheep and its relation to the size and shape of particles in the digestive tract	289
Volcani, R., see Levy, D.	
WALKER, T., KAY, M., PRESTON, T. R., McDonald, I., MacLeod, N. A., and MacDearmid, A. The performance of beef cattle given diets of barley supplemented with either vegetable protein or non-protein nitrogen .	381
WALKER, T., see also KAY, M.	

CONTENTS	vii
Watson, J. H., and Broadbent, J. S. Inherited variation in carcass composition of Suffolk × Welsh lambs	257
WATSON, J. H., see also MARSHALL, JANET E.	
WILLIS, M. B., and PRESTON, T. R. The performance of different breeds of beef cattle in Cuba	77
WINFIELD, C. J., BROWN, W., and LUCAS, I. A. M. Some effects of compulsory exposure over winter on in-lamb Welsh Mountain ewes	451
WOOD, P. D. P., see JOBST, D., and also O'CONNOR, L. K.	
Young, G. B., see Taylor, St. C. S.	
PROCEEDINGS OF THE 47TH MEETING OF THE BRITISH SOCIETY OF ANIMAL PRODUCTION, HARROGATE, 25-27 MARCH 1968	231

ERRATUM

ANIMAL PRODUCTION, Volume 10, part 4, p. 445

The last paragraph of the Introduction to the paper by Christensen should read:

"In this paper the phenotypic and genetic relationships among the traits are examined on the original and the transformed scales and the two methods are compared and their implications in selection are discussed." Tables should be as simple and as few as possible. When constructing tables, it would be helpful if authors would take into account the size and shape of the pages of *Animal Production*.

Summary: Every article should have a short summary complete in itself and understandable without reference to the paper. The summary will be printed at the beginning of the paper (commencing with vol. 11).

References: Only papers closely related to the author's work should be referred to; exhaustive lists should be avoided. Bibliographical details should be in the following order: author's name, initials, year, title of paper, title of journal (abbreviated according to the World List of Scientific Periodicals), volume of journal, first and last page of paper. References should be listed in alphabetical order. When abstracts are referred to the page reference should be followed by (Abstr.).

Examples:

BLAXTER, K. L. and WILSON, R. S. 1962. The voluntary intake of roughages by steers. *Anim. Prod.* 4: 351-358.

HAMMOND, J. 1932. Growth and the Development of Mutton Qualities in the Sheep. Oliver and Boyd, Edinburgh.

In the text, references should be made by giving author and year; at the first mention all authors should be named, thereafter the first author followed by et al. should be used for papers with more than two authors.

Proofs are supplied once in galley form and must be returned corrected to the Editors within seven days. Only essential corrections should be made.

Reprints: Twenty-five reprints of each paper will be supplied free to authors on request. Further copies may be purchased if the order is sent at the galley proof stage. No free reprints are supplied for Notes, but copies may be purchased.

Animal Production is published four times a year. Annual subscription for every four numbers is 90s. (or \$14.00 in the U.S.A. and Canada) and the price for a single number is 25s. (or \$4.00) net.

Business matters, including regular subscriptions and sales (the current Journal, back numbers, the Proceedings of the British Society of Animal Production (1944-58) and reprints), should be addressed to Messrs. Oliver & Boyd Ltd., Tweeddale Court, 14 High Street, Edinburgh 1.

Senior Editor

GERALD WIENER, A.R.C. Animal Breeding Research Organisation.

Editors

- J. F. D. GREENHALGH, Rowett Research Institute.
- G. HARRINGTON, Meat and Livestock Commission.
- I. L. MASON, Institute of Animal Genetics.
- L. E. MOUNT, A.R.C. Institute of Animal Physiology.

CONTENTS

PAGE

Cole, D. J. A., Duckworth, J. E., Holmes, W. and Cuthbertson, A. Factors affecting voluntary feed intake in pigs. 3. The effect of a period of feed restriction, nutrient density of the diet and sex on intake, performance and carcass characteristics	345
DUCKWORTH, J. E., and HOLMES, W. Selection for carcass length in Large White pigs	359
ROGERSON, A., LEDGER, H. P., and FREEMAN, G. H. Food intake and live-weight gain comparisons of <i>Bos indicus</i> and <i>Bos taurus</i> steers on a high plane of nutrition	373
WALKER, T., KAY, M., PRESTON, T. R., McDonald, I., MacLeod, N. A., and MacDearmid, A. The performance of beef cattle given diets of barley supplemented with either vegetable protein or non-protein nitrogen	381
TAYLOR, ST C. S., and YOUNG, G. B. Equilibrium weight in relation to food intake and genotype in twin cattle	393
Donald, H. P., Read, J. L., and Russell, W. S. A comparative trial of crossbred ewes by Finnish Landrace and other sires	413
HANRAHAN, T. J., and O'GRADY, J. F. Copper supplementation of pig diets. The effect of protein level and zinc supplementation on the response to added copper	423
PERRY, G. C., and LECCE, J. G. The rearing of colostrum-deprived piglets	433
CHRISTENSEN, K. Relationship between milk composition and yield of milk, fat and protein in Red Danish cattle	445
WINFIELD, C. J., Brown, W., and Lucas, I. A. M. Some effects of compulsory exposure over winter on in-lamb Welsh Mountain ewes	451
Donald, H. P., and Russell, W. S. Some aspects of fertility in purebred and crossbred dairy cattle	465
JACKSON, P., HODGSON, J., and ROOK, J. A. F. The voluntary intake of acetate by dairy cows given ammonium salts of short-chain fatty acids in their drinking water	473
KILKENNY, J. B. A note on estimates of the repeatability of weaning weight in beef cattle	483
MACLEOD, N. A., MACDEARMID, A., and KAY, M. Intensive beef production. 9. A note on the performance of Friesian and Ayrshire steers fattened on a cereal diet	487
JOBST, D., and WOOD, P. D. P. A note on the seasonal effect on the growth rate of Hereford cross Friesian male calves	491

COFYRIGHT © 1968 THE BRITISH SOCIETY OF ANIMAL PRODUCTION

Printed and Published in Great Britain by OLIVER AND BOYD LTD. Edinburgh: Tweeddale Court London: 39A Welbeck Street, W.1