

Animal Production

Journal of the British Society of Animal Production

Edited by

J. A. F. ROOK
P. J. AVERY
R. C. CAMPLING
M. F. FULLER
C. J. M. HINKS
R. B. LAND
T. L. J. LAWRENCE
J. M. MANSON
A. M. RAVEN
J. H. B. ROY
A. J. F. WEBSTER

Volume 34

1982

Longman 

COPYRIGHT © 1982 BRITISH SOCIETY OF ANIMAL PRODUCTION
PRINTED IN GREAT BRITAIN BY
BELL & BAIN LIMITED, GLASGOW

CONTENTS OF VOLUME 34

(LISTED ALPHABETICALLY BY AUTHOR)

	PAGE
ALKASS, J. E., BRYANT, M. J. and WALTON, J. S. Some effects of level of feeding and body condition upon sperm production and gonadotropin concentrations in the ram	265
ALLISTON, J. C., <i>see</i> KEMPSTER, A. J.	
ARMBRUSTER, S. L., <i>see</i> HORN, G. W.	
ARNALL, D., <i>see</i> KEMPSTER, A. J.	
ARORA, R. C. and PANDEY, R. S. Plasma concentrations of progesterone, oestradiol-17 β and luteinizing hormone in relation to repeat breeding in buffalo (<i>Bubalus bubalis</i>)	139
BAILIE, J. H. The influence of breeding management efficiency on dairy herd performance	315
BAISHYA, N., MORANT, S. V., POPE, G. S. and LEAVER, J. D. Rearing of dairy cattle. 8. Relationships of dietary energy intake, changes in live weight, body condition and fertility	63
BAKER, R. D., BARKER, J. M. and LE DU, Y. L. P. The influence of winter nutrition, grazing system and stocking rate on the performance of spring-calving Hereford \times Friesian cows and their calves. 2. Grazing system and stocking rate	225
BAKER, R. D., LE DU, Y. L. P. and BARKER, J. M. The influence of winter nutrition, grazing system and stocking rate on the performance of spring-calving Hereford \times Friesian cows and their calves. 1. Winter nutrition	213
BARKER, J. D., <i>see</i> KEMPSTER, A. J.	
BARKER, J. M., <i>see</i> BAKER, R. D.	
BASS, JEAN M., FISHWICK, G. and PARKINS, J. J. A note on the effect of limestone supplementation on the performance of cattle given barley-based diets	351
BEILHARZ, R. G. The effect of inbreeding on reproduction in mice	49
BRIGSTOCKE, T. D. A., <i>see</i> LINDEMAN, M. A.	
BRYANT, M. J., <i>see</i> ALKASS, J. E., <i>also</i> HAMRA, A. M., <i>also</i> ROWLINSON, P.	
CAMPBELL, R. G. The effects of carbadox on the performance and carcass characteristics of early-weaned pigs given high- and low-protein diets	111
CHARLES, D. D. Meat tenderness and palatability of Swamp buffalo and four breeds of cattle	79
CHESTNUTT, D. M. B. The effect of weaning date on the performance of autumn-calving, single-suckled cows.	71
COLE, D. J. A., <i>see</i> TAYLOR, A. J., <i>also</i> TILTON, J. E.	
COOK, G. L., <i>see</i> KEMPSTER, A. J., <i>also</i> SOUTHGATE, J. R.	
COWAN, R. T., ROBINSON, J. J. and McDONALD, I. A note on the effects of body fatness and level of food intake on the rate of fat loss in lactating ewes	355
DEWEY, P. J. S., <i>see</i> WAINMAN, F. W.	
DHANO, M. S. and LE DU, Y. L. P. A partial adjustment model to describe the lactation curve of a dairy cow	243
DHANO, M. S., <i>see also</i> KAISER, A. G.	
DUCKER, M. J., YARROW, N. and MORANT, S. V. The effect of change and level of nutrition on the reproductive performance of group-fed dairy heifers	203
EDWARDS, S. A. Factors affecting the time to first suckling in dairy calves	339
ELLIOT, J. I., LODGE, G. A., FORTIN, A. and LARMOND, ELIZABETH. Reproductive performance, growth and carcass characteristics of gilts mated at puberty, restricted in food intake during gestation and slaughtered post-partum	17
ENGLAND, P., <i>see</i> KAISER, A. G.	
FISHWICK, G., <i>see</i> BASS, JEAN M.	
FORTIN, A., <i>see</i> ELLIOT, J. I.	
FRAPPELL, J. P., <i>see</i> WOOD, P. D. P.	
FRASER, C., <i>see</i> GONZALEZ, J. S.	
GALAL, E. S. E., <i>see</i> KEBEDE, B.	

	PAGE
GIBB, M. J. and TREACHER, T. T. The effect of body condition and nutrition during late pregnancy on the performance of grazing ewes during lactation	123
GONZALEZ, J. S., ROBINSON, J. J., MCHATTIE, I. and FRASER, C. The effect in ewes of source and level of dietary protein on milk yield, and the relationship between the intestinal supply of non-ammonia nitrogen and the production of milk protein	31
GORDON, F. J. The effect of pattern of concentrate allocation on milk production from autumn-calving heifers	55
GRIFFITHS, T. W. Effects of trenbolone acetate and resorcylic acid lactone on protein metabolism and growth in steers	309
HAMRA, A. M. and BRYANT, M. J. The effects of level of feeding during rearing and early pregnancy upon reproduction in young female sheep	41
HORN, G. W., ARMBRUSTER, S. L. and SIMS, P. L. A note on supplemental protein and monensin for steers wintered on dormant native range	103
HUNTER, E. A., <i>see</i> VIPOND, J. E.	
INNES, G. M., <i>see</i> MACDEARMID, A.	
JONES, P. W. and TARRANT, M. E. The effect of various factors on the efficacy of tylosin as a growth promoter in clinically healthy pigs	115
KAISER, A. G., OSBOURN, D. F., ENGLAND, P. and DHANOA, M. S. The utilization by calves of formaldehyde-treated maize silages and the response to supplementary protein	179
KAY, M., <i>see</i> MACDEARMID, A.	
KEBEDE, B. and GALAL, E. S. E. A study of body weight from birth to 1 year of age in European-zebu crossbred cattle in Ethiopia	85
KEMPSTER, A. J., ARNALL, D., ALLISTON, J. C. and BARKER, J. D. An evaluation of two ultrasonic machines (Scanogram and Danscanner) for predicting the body composition of live sheep	249
KEMPSTER, A. J., COOK, G. L. and SOUTHGATE, J. R. A comparison of the progeny of British Friesian dams and different sire breeds in 16- and 24-month beef production systems. 2. Carcass characteristics, and rate and efficiency of meat gain	167
KEMPSTER, A. J., <i>see also</i> SOUTHGATE, J. R.	
KING, MARGARET E., <i>see</i> VIPOND, J. E.	
LARMOND, ELIZABETH, <i>see</i> ELLIOT, J. I.	
LEAVER, J. D., <i>see</i> BAISHYA, N.	
LE DU, Y. L. P., <i>see</i> BAKER, R. D., <i>also</i> DHANOA, M. S.	
LEIBHOLZ, JANE. Utilization of casein, fish meal and soya bean proteins in dry diets for pigs between 7 and 28 days of age	9
LESSER, D., <i>see</i> SMITH, W. C.	
LEWIS, D., <i>see</i> TAYLOR, A. J.	
LINDEMAN, M. A., BRIGSTOCKE, T. D. A. and WILSON, P. N. A note on the response of growing rabbits to varying levels of sodium hydroxide-treated straw	107
LODGE, G. A., <i>see</i> ELLIOT, J. I.	
MACDEARMID, A., INNES, G. M., WILLIAMS, P. E. V. and KAY, M. Kale for beef production	191
MCDONALD, I., <i>see</i> COWAN, R. T.	
MCHATTIE, I., <i>see</i> GONZALEZ, J. S.	
MCILMOYLE, W. A., <i>see</i> STEEN, R. W. J.	
MORANT, S. V., <i>see</i> BAISHYA, N., <i>also</i> DUCKER, M. J.	
OSBOURN, D. F., <i>see</i> KAISER, A. G.	
PANDEY, R. S., <i>see</i> ARORA, R. C.	
PARKINS, J. J., <i>see</i> BASS, JEAN M.	
PETERS, A. R. and RILEY, G. M. Milk progesterone profiles and factors affecting <i>post partum</i> ovarian activity in beef cows	145
POOLE, D. A. The effects of milking cows three times daily	197
POPE, G. S., <i>see</i> BAISHYA, N.	

	PAGE
RILEY, G. M., <i>see</i> PETERS, A. R.	
ROBELIN, J. A note on the estimation <i>in vivo</i> of body fat in cows using deuterium oxide or adipose-cell size	347
ROBINSON, J. J., <i>see</i> COWAN, R. T., <i>also</i> GONZALEZ, J. S.	
ROWLINSON, P. and BRYANT, M. J. Lactational oestrus in the sow. 2. The influence of group-housing, boar presence and feeding level upon the occurrence of oestrus in lactating sows	283
RUSSELL, W. S. Effect of pregnancy and lactation on growth of linear measurements in Ayrshire cattle	329
SIMS, P. L., <i>see</i> HORN, G. W.	
SMITH, W. C. and LESSER, D. An economic assessment of pale, soft exudative musculature in the fresh and cured pig carcass	291
SOUTHGATE, J. R., COOK, G. L. and KEMPSTER, A. J. A comparison of the progeny of British Friesian dams and different sire breeds in 16- and 24-month beef production systems. 1. Live-weight gain and efficiency of food utilization	155
SOUTHGATE, J. R., <i>see also</i> KEMPSTER, A. J.	
STEEN, R. W. J. and MCILMOYLE, W. A. An evaluation of red clover silage for beef production	95
STEEN, R. W. J. and MCILMOYLE, W. A. Effect of animal size on the response in the performance of beef cattle to an improvement in silage quality	301
TARRANT, M. E., <i>see</i> JONES, P. W.	
TAYLOR, A. J., COLE, D. J. A. and LEWIS, D. Amino acid requirements of growing pigs. 3. Threonine	1
TILTON, J. E. and COLE, D. J. A. Effect of triple versus double mating on sow productivity.	279
TREACHER, T. T., <i>see</i> GIBB, M. J.	
VIPOND, J. E., HUNTER, E. A. and KING, MARGARET E. Effects of cereal and protein supplements to swedes (<i>Brassica napus</i>) on intake and performance of pregnant and lactating ewes kept indoors.	131
WAINMAN, F. W. and DEWEY, P. J. S. The energy value to ruminants of malt distillers' draff, and of a mixture of draff and pot ale syrup	325
WALTON, J. S., <i>see</i> ALKASS, J. E.	
WILLIAMS, P. E. V., <i>see</i> MACDEARMID, A.	
WILSON, P. N., <i>see</i> LINDEMAN, M. A.	
WOLF, B. T. An analysis of the variation in the lean tissue distribution of sheep	257
WOOD, P. D. P. and FRAPPELL, J. P. A note on the relationship between milk yield and reproductive performance in some British Friesian sire progeny groups	239
YARROW, N., <i>see</i> DUCKER, M. J.	
 TITLES AND ABSTRACTS OF PAPERS FOR PRESENTATION AT THE 78TH MEETING OF THE BRITISH SOCIETY OF ANIMAL PRODUCTION, Harrogate, 29 to 31 March 1982	 359

ANIMAL PRODUCTION

NOTES FOR THE GUIDANCE OF CONTRIBUTORS

CONTENTS		INTRODUCTION	
Introduction	vii	<i>Page</i>	<i>Animal Production</i> publishes reports in English of
Typescripts	vii		<i>original</i> work in the field of animal production,
1. Preparation of papers	vii		or in any related scientific field. The Editors will
Statistical treatment of results	vii		consider articles on any aspect of research or
Tables	viii		development, provided the work described has
Abstract	viii		been carried out in a systematic way, and articles
References	viii		critically re-examining published information.
Title	ix		Reviews of the literature are not accepted.
2. Typing	ix		Reports on techniques will be published only as
3. Illustrations	ix		appendices to scientific papers. Contributions
4. Submission of papers	ix		should be concise. Results of research which do
Typographical conventions and			not warrant a comprehensive presentation may
consistencies	ix		be submitted for consideration as a <i>Note</i> . Notes
1. Headings	ix		are not intended for the publication of interim
2. Capitals	x		results. They should not exceed 2000 words or
3. Italics	x		the equivalent inclusive of tables and
4. Hyphens	x		illustrations.
5. Numerals	xi		Papers are published on the understanding that
6. Parenthesis	xi		they have not been and, with the exception of
7. Quotation marks	xi		authors' abstracts, will not be published
8. Spelling	xi		elsewhere without the Editors' written
9. Units of measurement	xiii		permission. Authors' abstracts may be
10. Symbols and standard abbreviations	xiii		reproduced if full acknowledgement of the source
11. Other abbreviations	xiv		is made.
Nomenclature of farm animals	xv		
1. General	xv		
2. Descriptive words for use in	xv		
definition	xv		
3. Standard sex and age terminology	xvi		
Proofs	xvi		
Authoritative sources	xvi		
American Copyright Protection Act	xvi		
Submission conditions	xvi		

INTRODUCTION

Animal Production publishes reports in English of original work in the field of animal production, or in any related scientific field. The Editors will consider articles on any aspect of research or development, provided the work described has been carried out in a systematic way, and articles critically re-examining published information. Reviews of the literature are not accepted. Reports on techniques will be published only as appendices to scientific papers. Contributions should be concise. Results of research which do not warrant a comprehensive presentation may be submitted for consideration as a *Note*. Notes are not intended for the publication of interim results. They should not exceed 2000 words or the equivalent inclusive of tables and illustrations.

Papers are published on the understanding that they have not been and, with the exception of authors' abstracts, will not be published elsewhere without the Editors' written permission. Authors' abstracts may be reproduced if full acknowledgement of the source is made.

TYPESCRIPTS

1. Preparation of papers

The responsibility for the preparation of a paper in a form suitable for publication lies in the first place with authors. They should consult a current issue in order to make themselves familiar with the layout and style of the journal. The typographical and other conventions to be adopted are set out below.

Statistical treatment of results. The methods of statistical analysis must be indicated but

statistical details should be given only if they are relevant to the discussion. Where reference is made to statistical significance, the level of significance attained should be indicated using the following conventional standard abbreviations (which need not be defined): NS for non-significance, and *, ** and *** respectively for significance at the 0.05, 0.01 and 0.001 levels.

Tables should be as simple and as few as possible. The same material should not normally be presented in both tabular and graphical form. In designing tables, authors should take account of the size and shape of the pages and columns of text of *Animal Production*. Each table should be typed, preferably in double spacing, on a page separate from the main body of the text and an indication given in the text where it should be inserted. Tables should be given arabic numbering and each should have its own explanatory title (in italics, i.e. underlined). Subtitles are also in italics and, if on a separate line, are in a smaller type size.

Column headings should be concise and units should be clearly stated using standard abbreviations. Only the first letter of the first word is in capitals. Cross-headings (dividing a table into several parts horizontally) are normally italicized. Stub-items (describing the data in the rows) should be indented relative to cross-headings; where they involve printing on more than one line they should be indented in the second and subsequent lines. Sub-stub-items should also be indented.

Footnotes should be used sparingly and kept brief. The reference symbols used are, in order, † ‡ § ¶. Numbers and letters should be avoided. Asterisks should be reserved for indicating levels of statistical significance.

Abstract. Every paper should have a short abstract (not more than 250 words), complete in itself and understandable without reference to the paper. It will be printed at the beginning of the paper. It is often preferable for the abstract to be arranged in short numbered paragraphs. It should state succinctly the problem, the experimental methods, results and conclusions. *Abbreviations and references must be avoided.* Further information on the writing of an abstract may be obtained from: O'Connor, M. and Woodford, F. P. 1975. *Writing Scientific Papers in English*. Elsevier, Amsterdam.

References. Literature cited should be listed in alphabetical order of authors. Bibliographical details should be in the following order: author's name, initials, year, title of paper in *English* (when translated, put title in square brackets), title of journal—abbreviated according to the *World List of Scientific Periodicals* (4th ed., Butterworth, London, 1963/65) and *British Union Catalogue of Periodicals: New Periodical Titles 1960–* (Butterworth, London, 1970–), volume of journal, first and last page of paper. (A selected list of titles of biological journals abbreviated according to these recommendations has been published in *Abbreviated Titles of Biological Journals* (3rd ed., Biological Council, London, 1968).) When abstracts are referred to, the page reference should be followed by (Abstr.). A full stop should follow the 'author' even if it is an institution (or if the forename in full replaces the more usual initials). One forename of female authors should be given.

References should be set out as in the following examples.

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

HAMMOND, J. 1932. *Growth and the Development of Mutton Qualities in the Sheep*. 2nd ed. Oliver and Boyd, Edinburgh.

MOUSTGAARD, J. 1962. Foetal nutrition in the pig. In *Nutrition of Pigs and Poultry* (ed. J. T. Morgan and D. Lewis), pp. 189–206. Butterworth, London.

If only single pages in a book are referred to, these should be given after the title. Note also:

Tech. Bull. Ore. agric. Exp. Stn, No. 96.

Ph.D. Thesis, Fac. Agric., Univ. Reading.

Proc. Conf. Eur. Ass. Anim. Prod., Gödöllő, Hungary.

Proc. 8th int. Grassld Congr., Reading, p. 606.

Rep. agric. Res. Coun., 1962/63, p. 16.

In press.

(Mimeograph).

In the text, references should be cited by author and year. At the first mention all authors should be named; thereafter, papers with more than two authors should be referred to by the first author followed by *et al.* Names of organizations used as authors (e.g. Milk Marketing Board, Agricultural Research Council) should be written out in full in the list of references and on first mention in the text. Subsequent mentions may be reduced to MMB, ARC etc. Ampersands (&) are not permitted and multiple references should be as follows:

(Keith *et al.*, 1955 and 1959; Flint and James, 1958a and b).

'Personal communication' or 'unpublished results' should follow the name of the author in the text, where appropriate. The author's initials should be included but not his title. Such citations should not be included in the list of references.

Check that all of the references in the text are in the list of references and *vice versa*.

Title. A title needs to be concise yet informative. It should:

- (a) arrest the attention of a potential reader scanning a journal or a list of titles;
- (b) provide sufficient information to allow the reader of a title journal to judge the relevance of a paper to his interests and whether it will repay the effort of obtaining it;
- (c) incorporate keywords or phrases that can be used in indexing and information retrieval; and
- (d) avoid inessentials such as 'A detailed study of . . . '.

2. Typing

Typescripts should be typed on one side of the paper in double-line spacing with wide margins and each page should be numbered. *The lines on each page of the typescript* also should be clearly numbered beginning with number one at the top of each page. The top copy should be on good-quality paper.

3. Illustrations

- (a) *Diagrams* should be drawn in Indian ink, on Bristol board, stout tracing paper or plastic film, about twice the size of the finished figure, which will be the smallest size (printed) consistent with clarity. Photographed diagrams are also accepted. *Lettering inside the framework of the diagram should be avoided as far as possible; if unavoidable, it should be included on a fly-leaf. Marginal lettering should be inserted lightly in pencil on the original diagram or on a fly-leaf.*
- (b) *Plates:* Photographs intended for half-tone reproduction should be on glossy paper and will be accepted only if found necessary by the Editors. Colour plates are unlikely to be accepted unless authors bear the cost.

(c) *Captions* for all figures should be typed on a sheet of paper separate from the body of the text, but an indication of where a figure should appear should be given within the text. Diagrams and Plates are referred to within the text as Figure 1, Figure 2, etc., but captions begin with FIG. 1., FIG. 2., etc. Plates should have a Figure number in the same series as diagrams within the paper.

4. Submission of papers

Three copies, *one of which must be the original*, of the typescript and illustrations are required by the Editors. Typescripts are not returned with proofs; authors should therefore retain copies. Typescripts produced on word processors are acceptable if they conform to the normal requirements.

TYPOGRAPHICAL CONVENTIONS AND CONSISTENCIES

1. Headings

Animal Production convention is as follows:

- (a) *Title* of the paper is in large capitals and any subtitle is in small capitals. Authors' names are in capitals and small capitals and their addresses are in italics. (Addresses include country names only for countries outside the United Kingdom.)
- (b) *Main section headings* (ABSTRACT, INTRODUCTION, MATERIAL AND METHODS, RESULTS, DISCUSSION, ACKNOWLEDGEMENT(S), REFERENCES) are printed in small capitals throughout and placed centrally in the line of type. (In *Notes* the only headings required are ABSTRACT, ACKNOWLEDGEMENT(S) and REFERENCES.)
- (c) *Subheadings* are italicized and only the initial letter is in capitals. The two main classes are:
 - (i) Side italics unpunctuated (shoulder headings).
 - (ii) Indented italics, punctuated and text run-on (side headings).

When more than two types are needed, centred italics (iii) may be used.

The sequence is always (iii) to (i) to (ii). In cases where only one type is required it

is left to the editor's discretion which class is adopted.

Note: In typescripts, capitals are denoted by triple underlining (≡≡≡) and small capitals by double underlining (≡≡), italics by single underlining (—) and bold type by a wavy line (~~~~).

2. Capitals

- (a) Initial capitals are used for proper nouns, for adjectives formed from proper names, for generic names, and for names of classes, orders and families.
- (b) Names of diseases are not normally capitalized.

3. Italics

Words to be italicized should be underlined in manuscript or typescript. Use italics for:

- (a) titles of books and names of periodicals in the text and in references;
- (b) authors' addresses;
- (c) subheadings (see above);
- (d) titles for tables (but not captions for figures);
- (e) most foreign words, especially Latin phrases,

e.g. *ad hoc*
ad libitum
et al.
in situ
inter alia
inter se
in vitro
per se
post mortem
post partum } (adverbial)
vide

but *no italics* for

corpus luteum
 cf. }
 e.g. } no following comma
 i.e. }
 N.B. }
 etc. }
post-mortem
post-partum } (adjectival)
 via

- (f) mathematical unknowns and constants;
- (g) generic and specific names;

(h) letters or numbers in the text which refer to corresponding letters or numbers in an illustration;

(i) letters used as symbols for genes or alleles e.g. *Hb^A*, *Tf^D* (but not chromosomes or phenotypes of blood groups, transferrins or haemoglobins, e.g. HbAA, TfDD);

(f) first occurrence of a special term;

(k) repeated emphasis of a special term (use cautiously);

(l) Latin names of muscles (but not of bones), e.g. *m. biceps femoris*.

4. Hyphens

In *numerical* expressions hyphens should be used:

(a) between the numerator and denominator of a fraction when spelled out (e.g. one-third), and in compound numbers (e.g. twenty-four);

(b) in adjectival phrases such as '3-year-old' when they precede the noun;

(c) between figures in tables to indicate a range. In running text the word 'to' is usually preferable. Always write 'from 9 to 12' not 'from 9–12' except when it is in the form 'from 9–12 to 18–21'.

Temporary hyphens should be used as follows:

(a) In compound modifiers (double-barrelled adjectives or phrases used attributively) when it is necessary to avoid misunderstanding or to aid understanding, e.g. short-term trend, two-egg twins, 12-week period, all-pelleted diet. Note the difference in meaning between 'superfluous-hair remover' and 'superfluous hair-remover' and between 'white-fish meal' and 'white fish-meal'.

(b) After some prefixes used temporarily (e.g. anti-oestrogenic, ex-army, intra-class, non-active, pre-treatment, semi-conductor).

Hyphens should be avoided:

(a) between the parts of a compound modifier which follows the noun modified (e.g. the wool was dirty white);

(b) between the parts of a well known open-compound noun used to modify a substantive (e.g. sodium chloride solution, examination *post mortem*);

- (c) between an adverb and the objective it modifies even if they precede the noun (N.B. 'well known scientist' but dirty-white wool').

Permanent hyphens should be used between the parts of a compound noun (or verb) not yet acceptable as a single word. The necessity for a link between the two parts is normally indicated by the reduction of two accents to one and the fact that the compound word has a different meaning from the two words used separately. It is preferable to join up the single elements if possible without offending or misleading the eye, e.g. 'crossover' but not 'crosssection'.

For special cases see the section on *Spelling* below.

5. Numerals

- (a) In text, use words for numbers zero to nine and figures for higher numbers. In a series of two or more numbers, use figures throughout irrespective of their magnitude.
- (b) For large numbers in the text substitute ' $\times 10^n$ ' for part of a number (e.g. 1.6×10^6 for 1 600 000).
- (c) Use figures whenever a number is followed by a standard unit of measurement (e.g. 100 g, 6 days, 4th week).
- (d) Use figures for dates, page numbers, class designations, fractions, expressions of time, e.g. 1 January 1966; page 5; type 2.
- (e) Sentences should not, however, begin with figures.
- (f) The decimal sign between digits in a number should be a point (·).
- (g) To facilitate the reading of long numbers the digits should be grouped in threes about the decimal sign but no point or comma should be used.
- (h) For values less than unity, 0 should be inserted before the decimal point.
- (i) The multiplication sign between numbers should be a cross (\times).
- (j) Division of one number by another should be indicated as follows: 136/273.
- (k) Where figures are altered by multiplication, the multiplication factor must be clearly shown, e.g. a series of variance estimates multiplied by 10^4 would be headed 'Variance ($\times 10^4$)', not $\times 10^{-4}$, which would be the power necessary to reduce them to their original values.

- (l) Dates should be given with the month written out in full in the text and with the day in figures (i.e. 12 January *not* 12th January). Single non-calendar years should be written 1961/62; periods of two calendar years as 1961–62, and of two non-calendar years as 1962/63–63/64.

- (m) For time use 24-h clock, e.g. 09.05, 13.20 h.

6. Parenthesis

Parenthesis takes four main forms: (a) commas, (b) dashes, (c) round brackets and (d) square brackets. A general rule is almost impossible to formulate, but it should be noted that the 'strength' of the parenthetical effect increases from (a) through (b) and (c) to (d). It follows therefore that (d) should be avoided if (c) will suffice, and so on. It should be noted that the distinction in emphasis between (b) and (c) is very marginal. Square brackets (d) are often used to denote material inserted by a quoter, editor or translator.

Note that a dash is differentiated from a hyphen by typing the former as two unspaced hyphens.

7. Quotation marks

Single quotation marks should be used around:

- (a) all direct quotations;
- (b) titles of articles and parts of books (in the text, not in list of references);
- (c) new technical terms or old terms used in a new sense.

Double quotation marks should be used around a word, title or term within a quotation.

If a quotation extends over more than one paragraph, begin each paragraph with a single quotation mark but close the quotation only at the end of the last paragraph.

8. Spelling

The spelling of the *Shorter Oxford English Dictionary (SOED)* (3rd ed., Clarendon Press, Oxford, 1944), should be used, except that the hyphen should be omitted from compound words in common use. The following specific words for which there is a preferred spelling or which, because of their specialized nature, are omitted from *SOED*, should be noted. Care should be exercised in the use of agricultural terminology that is ill-defined and of local familiarity only.

acclimatize	fish meal	neonatal
acknowledgement	flockbook	newborn
ageing	foodstuff	oestrous (adj.)
albumen (egg white)	forequarter	oestrus (noun)
albumin (protein)	gelatin	ovariectomy
amino acid	genotype ×	overall (noun, adv. or adj.)
analyse	environment interaction	overestimate
antenatal	gonadotropin	perinatal
autosexing	greasy weight	post-mortem (adjectival)
backfat	grey	†post-weaning
biased	guinea-pig	prenatal
birthcoat	halfbred	†pre-weaning
birth type	†heat-resistant	product-moment correlation
birth weight	herdbook	†progeny-tested
bloodline	†high-producing	pronucleate
body weight	hindquarter	pseudopregnant
breech (not britch)	homeothermic	purebred
by-product	indexes (books)	purebreeding
Caesarean	indices	pycnosis, -notic
cannon bone	(mathematics)	racehorse
carcass	inflexion	reflexion
carotene	-ize (not -ise) as	rôle
†clear-cut	suffix in verbs	†self-fed
coloration	(but not, of	†self-feeding
connexion	course, in advise,	sex linkage
cooperate	comprise,	sex-linked
coordinate	compromise,	skim milk
covariance	devise, enterprise,	soya bean
cover-slip	excise, exercise,	spay
crossbred	improvise, revise,	stillbirth
cross-section	supervise,	stillborn
crossing-over	surprise).	studbook
cryptorchidism	killing-out	subclass
daylength	proportion	subgroup
deflexion	leucaemia	subsample
depot	leucosis	sugar beet
dioestrus	life cycle	summarize
draft	lifetime	test-tube
dressing proportion	linecross(ing)	textbook
†dry-matter	linebred	thyroxine
dry matter (noun)	linebreeding	underestimate
†dual-purpose	littermate	wooled
dystocia	liveborn	woollen
egg-yolk phosphate	livestock	woolly
élite	live weight	
eye muscle	†live-weight gain	
†eye-muscle area	meiosis	
†fat-corrected	milk fat	
feed-back	†milk-recorded	
foetuses		

†Hyphenate only when used as adjective and preceding noun.

9. Units of measurement

The International System of Units (SI) should be used, with the recommendations and modifications in *Quantities, Units and Symbols*. 2nd ed., Royal Society, London, 1975 and *Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences*. Royal Society, London, 1972—reproduced in *Proc. Nutr. Soc.* **31**: 239–247, 1972. Day, week, month and year are not abbreviated. The abbreviations for some of the commoner units are as follows. The same abbreviation is used for singular and plural.

becquerel	Bq
degree Celsius	°C
gram	g
hectare	ha
hour	h
hydrogen ion concentration, negative exponent	pH
joule	J
litre	l
metre, square metre, cubic metre	m, m ² , m ³
minute	min
mole	mol
pascal	Pa
second	s
tonne (metric ton)	t

Only a few commonly used metric combinations are included in the above list. The following prefixes may be used to construct decimal multiples of units.

Multiple	Prefix	Symbol
10 ⁻¹²	pico	p
10 ⁻⁹	nano	n
10 ⁻⁶	micro	μ
10 ⁻³	milli	m
10 ³	kilo	k
10 ⁶	mega	M

Decimal multiples of the kilogram (kg) should be formed by attaching an SI prefix not to kg but to g, in spite of the kilogram and not the gram being the SI base unit.

A combination of prefix and symbol for a unit is regarded as a single symbol which may be raised to a power without the use of brackets, e.g. mm², mm³.

Multiplication and division of units. A product of two units should be represented as N·M and a quotient as N/M.

Concentration or composition. Composition expressed as mass per unit mass or mass per unit volume should have as denominator the unit of mass, the kilogram, or the unit of volume, the litre. Values should thus be expressed as nanograms, micrograms, milligrams or grams per kilogram or per litre. The term *content* should not be used for concentration.

Percentages. These must not be used to express concentration (see above) or the common ratios used in nutritional studies, for which decimals should be employed (e.g. digestibility should be expressed as 0.70, not 70%). In general, *the use of percentages should be avoided wherever possible.*

Vitamins. All amounts of vitamins should be expressed in terms of their mass rather than in terms of international units.

10. Symbols and standard abbreviations

These can be used without prior explanation. Chemical symbols for atoms and molecules should be used in the text only if they occur repeatedly.

(a) Mathematical symbols

smaller than	<
larger than	>
smaller than or equal to	≤
larger than or equal to	≥
equal to	=
not equal to	≠
approximately equal to	≈
approaches	→
proportional to	∝
infinity	∞
female	♀
male	♂
plus	+
minus	-
plus or minus	±
a multiplied by b	ab
a divided by b	a/b
a raised to the power n	a ⁿ
nth root of a	a ^{1/n}
mean value of a	\bar{a}

(b) Statistical terms

coefficient of variation	CV
correlation coefficient	r
degrees of freedom	d.f.
expectation of mean square	e.m.s.
least significant difference	LSD

mean square	m.s.
multiple correlation coefficient	<i>R</i>
non-significant	NS
probability	<i>P</i>
regression coefficient	<i>b</i>
standard deviation	s.d.
standard error	s.e.
standard error of estimate or residual standard deviation	<i>S_{y.x}</i> or residual
variance ratio	s.d.
$P < 0.05$	<i>F</i>
$P < 0.01$	*
$P < 0.001$	**

(c) *Standard abbreviations*

abstract	abstr.
anhydrous	anhyd.
approximate(-ly)	approx. or <i>ca.</i>
aqueous	aq.
average	av.
boiling point	b.p.
British Pharmacopoeia (designation of reagent quality)	BP
dilute	dil.
distilled	dist.
Experiment	Expt
Figure (in captions only)	FIG.
freezing point	f.p.
heritability	h^2
liquid	liq.
live body weight (mass) (in formula)	M
logarithm (in formula) common	\log_{10}
natural	\log_e
maximum	max.
melting point	m.p.
minimum	min.
number	no.
observed	obs.
recrystallized	recryst.
relative humidity	r.h.
respiratory quotient	r.q.
soluble	sol.
solution	soln
species (taxonomy)	sp.
versus (i.e. compared with)	<i>v.</i>

Elements and compounds may be represented by their chemical symbols. The symbol is not followed by a full stop. The right superscript position should be used, when required, to indicate charge (e.g. Cl⁻). The mass number should be inserted as a superscript preceding the symbol for an element and the number of atoms per molecule as a subscript following it (e.g. ¹⁴N₂).

Acronymic titles of computer languages are printed in small roman capitals and should be doubly underlined in the typescript.

(d) *Forms of address*

Dr, Ir, Jr, Ltd, Messrs, Miss, Mr, Mrs, Ms—without full stop.

11. *Other abbreviations*

These abbreviations should be avoided in the text unless the expression occurs very frequently. They should be given normally in full at first textual reference followed by the appropriate abbreviation in brackets.

The rules for the full stops are:

- (1) Abbreviations in capitals have no full stops.
- (2) Lower case abbreviations have full stops unless the last letter of the abbreviation is also the last letter of the word.

Commonly used abbreviations are as follows:

adenosine triphosphate	ATP
adrenocorticotrophic hormone	ACTH
artificial insemination	AI
basal metabolic rate	b.m.r.
central nervous system	c.n.s.
centre of gravity	c.g.
deoxyribonucleic acid	DNA
diameter, inside	i.d.
diameter, outside	o.d.
digestible crude protein	DCP
digestible energy	DE
digestible organic matter	DOM
digestible organic matter in the dry matter	DOMD
dry matter	DM
electrocardiogram	e.c.g.
fat-corrected milk	FCM
follicle stimulating hormone	FSH
gas-liquid chromatography	g.l.c.
Greenwich Mean Time	GMT
haemoglobin	Hb

infrared	i.r.
luteinizing hormone	LH
metabolizable energy	ME
net energy	NE
non-protein nitrogen	NPN
organic matter	OM
pregnant mare's serum	PMS
protein equivalent	PE
red blood corpuscle	r.b.c.
ribonucleic acid	RNA
solids-not-fat	SNF
starch equivalent	SE
thin-layer chromatography	t.l.c.
thyroid stimulating hormone	TSH
total digestible nutrients	TDN
total solids	TS
ultraviolet	u.v.

symbols should not normally be used in the text.

Age:

- (i) Whenever possible in terms of days, weeks, months or years, as appropriate.
- (ii) In addition (or alternatively, if necessary) weight or weight range, or other size dimensions, describing the limits of the class.

Physiological state:

Growing, pregnant (or non-pregnant), lactating (or non-lactating), working, wool-producing, laying.

Breed function:

Milk (or dairy), meat, wool, hair, work, egg.

(N.B. *Avoid* hyphenated terms to link different states or functions, e.g. meat-milk, pregnant-lactating, growing-fattening).

NOMENCLATURE OF FARM ANIMALS

1. *General*

In the MATERIAL AND METHODS section, a clear definition should be given of each class of animal used in terms of species, breed (or cross), sex, age and physiological state. The agricultural function(s) of the class can often be added with advantage. This definition should precede the standard term (given in brackets) which may then be used in the Title, ABSTRACT, INTRODUCTION and subsequently in the text.

2. *Descriptive words for use in definition*

Species:

Cattle, sheep, goat, pig (or swine), horse, ass, fowl, turkey, duck, goose.

Breed:

Use full name (e.g. 'British Friesian' or 'Holstein-Friesian' *not* 'Friesian'). Consult Mason, I. L. 1969. *Dictionary of Livestock Breeds* (2nd ed. Commonwealth Agricultural Bureaux, Farnham Royal) for recommended English usage.

Crosses:

Show the breed constituents and sexes of respective parents. For example, a 3-way cross might be:

Suffolk ♂ × (Border Leicester ♂ × Scottish Blackface ♀)♀.

Sex:

Male (or ♂), female (or ♀), male castrate (♂ castrate), female castrate (♀ castrate). The

3. *Standard sex and age terminology*

Standard terms should be as precise as possible, e.g. write 'male calf' not 'bull calf', 'pregnant cow' not 'in-calf cow'. Terms should not be used to describe a defined class where the normal meaning of the term runs counter to the defined usage, e.g. where pregnancy has been induced in 3-month-old female sheep call them 'pregnant females' not 'lambs'.

		Young		Adult		
			Approx. upper age limit	♂	♀	Castrate
Cattle	♂ and ♀ calf	8 months	bull	cow (heifer)†	steer	
Sheep	lamb	6 months	ram	ewe	wether	
Goat	kid	6 months	buck	doe (goatling)†	—	
Pig	piglet	8 weeks	boar	sow (gilt)†	barrow	
Horse	foal	12 months	stallion (colt)†	mare (filly)†	gelding	
Fowl	chick	with down	cock (cockerel)†	hen (pullet)†	capon	
Turkey	poult	with down	stag	hen	—	
Duck	duckling	with down	drake	duck	—	
Goose	gosling	with down	gander	goose	—	
Rabbit	—	—	buck	doe	—	

†Alternative names for the young adult. In some instances the use is strictly defined, as for heifer to the end of the first lactation, for goatling and gilt to the end of the first pregnancy, and for pullet to the end of the first moult.

PROOFS

The following guidance is given by the Royal Society (see AUTHORITATIVE SOURCES below).

'Proofs are submitted so that authors can make sure that the printers have reproduced the typescript faithfully. Authors should not insert new matter into proofs to correct faults in the style or arrangement of their papers at this stage. Many journals quite justifiably ask authors to pay for the heavy costs of alterations made in proof that do not arise from mistakes in the setting up. However, any errors of fact or of logic that have escaped earlier notice must be corrected, even at this stage. . . .

'Authors are advised to pay particular attention to checking scientific and proper names, numerical data, formulae, tables and illustrations. Whilst printers' readers are competent in correcting proofs dealing with subjects of which they have no specialist knowledge, the ultimate responsibility for the correction rests with the author. The proofs should be compared with the original typescript, and it is helpful to have the proofs read by a colleague, since it is very difficult for an author to see mistakes in his own work.

'Marks for proof corrections are given in British Standard 5261: Part 2: 1976, *Copy preparation and proof correction*. The tables of symbols from this standard are available printed on stout card as British Standard 5261C: 1976. Corrections should be made as legibly as possible in ink, not pencil. Incorrect use of printers' symbols can be extremely misleading, and when a complicated correction has to be made it is

better to write a note in the margin explaining in plain English what is wanted. Directions to the printer which are not to be set up in type should be encircled.'

AUTHORITATIVE SOURCES

The following sources are taken as authoritative in matters not covered herein.

- FOWLER, H. W. 1965. *A Dictionary of Modern English Usage*. 2nd ed. Revised by Sir Ernest Gowers. Clarendon Press, Oxford.
- O'CONNOR, M. and WOODFORD, F. P. 1975. *Writing Scientific Papers in English*. Elsevier, Amsterdam.
- ROYAL SOCIETY. 1974. *General Notes on the Preparation of Scientific Papers*. 3rd ed. Royal Society, London.

AMERICAN COPYRIGHT PROTECTION ACT

Authors are required formally to transfer copyright to the British Society of Animal Production. A form for this purpose is sent to the senior author when an article is accepted and articles are not published until the completed form has been received by the editorial office. It should be made clear that signing the form does not put any limitation on the personal freedom of authors to use material contained in their article.

SUBMISSION CONDITIONS

Submission of a paper implies acceptance by the author(s) of editorial conventions and consistencies.

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 figure, on Bristol board, stout tracing paper or plastic film. Photographed diagrams are also accepted. *Lettering inside the framework of the diagram should be avoided as far as possible but if unavoidable it should be included on a fly-leaf. Marginal lettering should be inserted lightly in pencil on the original diagram or on a fly-leaf.*
- (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.

Tables should be as simple and as few as possible. Each table should be typed on a separate sheet.

Abstract. Every article should have a short abstract (not more than **250** words) complete in itself and understandable without reference to the paper. *The abstract will be printed at the beginning of the paper.*

References. Only papers closely related to the author's work should be referred to; exhaustive lists should be avoided. The arrangement of references should be as in recent papers in *Animal Production*; details are given in the notes for guidance.

Proofs are supplied once and must be returned corrected to the Editors *within 3 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 proof-stage.

Animal Production is published six times a year in two volumes. Annual subscription is £49·00 (or \$112·00 in the USA and Canada) and the price for a single part is £9·00 (or \$21·00) net.

Proceedings of the British Society of Animal Production (New Series) ceased publication in 1975 and the material is now published as a separate section in the June issue of *Animal Production*.

Business matters, including regular subscriptions and sales (current and back numbers of the Journal and the Proceedings), should be addressed to: Longman Group Limited Subscriptions (Journals) Department, Fourth Avenue, Harlow, Essex, England CM19 5AA.

Senior Editor

J. A. F. Rook, Agricultural Research Council

Editors

P. J. Avery, University of Reading
R. C. Campling, Wye College, University of London
M. F. Fuller, Rowett Research Institute
R. B. Land, Animal Breeding Research Organisation
T. L. J. Lawrence, University of Liverpool
J. M. Manson, East of Scotland College of Agriculture
A. M. Raven, Department of Agriculture and Fisheries for Scotland
J. H. B. Roy, National Institute for Research in Dairying
A. J. F. Webster, University of Bristol

Technical Editors

Jill M. Read
P. D. Wilson

CONTENTS

	PAGE
DHANOA, M. S. and LE DU, Y. L. P. A partial adjustment model to describe the lactation curve of a dairy cow	243
KEMPSTER, A. J., ARNALL, D., ALLISTON, J. C. and BARKER, J. D. An evaluation of two ultrasonic machines (Scanogram and Danscanner) for predicting the body composition of live sheep	249
WOLF, B. T. An analysis of the variation in the lean tissue distribution of sheep	257
ALKASS, J. E., BRYANT, M. J. and WALTON, J. S. Some effects of level of feeding and body condition upon sperm production and gonadotropin concentrations in the ram	265
TILTON, J. E. and COLE, D. J. A. Effect of triple versus double mating on sow productivity	279
ROWLINSON, P. and BRYANT, M. J. Lactational oestrus in the sow. 2. The influence of group-housing, boar presence and feeding level upon the occurrence of oestrus in lactating sows.	283
SMITH, W. C. and LESSER, D. An economic assessment of pale, soft exudative musculature in the fresh and cured pig carcass	291
STEEN, R. W. J. and MCILMOYLE, W. A. Effect of animal size on the response in the performance of beef cattle to an improvement in silage quality	301
GRIFFITHS, T. W. Effects of trenbolone acetate and resorcylic acid lactone on protein metabolism and growth in steers	309
BAILIE, J. H. The influence of breeding management efficiency on dairy herd performance	315
WAINMAN, F. W. and DEWEY, P. J. S. The energy value to ruminants of malt distillers' draff, and of a mixture of draff and pot ale syrup	325
RUSSELL, W. S. Effect of pregnancy and lactation on growth of linear measurements in Ayrshire cattle	329
EDWARDS, S. A. Factors affecting the time to first suckling in dairy calves	339
ROBELIN, J. A note on the estimation <i>in vivo</i> of body fat in cows using deuterium oxide or adipose-cell size	347
BASS, JEAN M., FISHWICK, G. and PARKINS, J. J. A note on the effect of limestone supplementation on the performance of cattle given barley-based diets	351
COWAN, R. T., ROBINSON, J. J. and McDONALD, I. A note on the effects of body fatness and level of food intake on the rate of fat loss in lactating ewes	355
TITLES AND ABSTRACTS OF PAPERS FOR PRESENTATION AT THE 78TH MEETING OF THE BRITISH SOCIETY OF ANIMAL PRODUCTION, Harrogate, 29 to 31 March 1982	359