THE JOURNAL OF DAIRY RESEARCH

EDITED BY

C. C. THIEL B.Sc., Ph.D.

The National Institute for Research in Dairying, Shinfield, Reading

and

J. A. B. SMITH, Ph.D., D.Sc., F.R.I.C. The Hannah Dairy Research Institute, Kirkhill. Avr

ASSISTED IN THE SELECTION OF PAPERS FOR PUBLICATION

ВY

PROF. L. F. L. CLEGG (Canada)

PROF. E. L. CROSSLEY (Reading)

PROF. D. B. CUTHBERTSON (Aberdeen)

DR H. P. DONALD (Edinburgh)

SIR PAUL FILDES, F.R.S. (Oxford)

PROF. P. J. J. FOURIE (South Africa)

PROF. R. C. GARRY, F.R.S.E. (Glasgow)

DR T. GIBSON (Edinburgh)

DR J. HAMMOND, F.R.S. (Cambridge)

MR G. LOFTUS HILLS (Australia)

DR J. O. IRWIN (London)

DR K. C. SEN (India)

SIR JAMES A. SCOTT WATSON (London)

DR H. R. WHITEHEAD (New Zealand)

VOLUME 26

CAMBRIDGE
THE UNIVERSITY PRESS
1959

Secretary H. F. BURGESS, M.B.E.

Editorial Assistant
M. HARVEY, A.C.I.S.

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.
Agents in Canada: The Macmillan Company of Canada Limited

CONTENTS

No. 1 (February 1959)

ORIGINAL ARTICLES:	PAGE
The effect of concentrates of high or low starch equivalent, both fed at two levels, on the milk production of dairy cows. M. E. CASTLE, D. S. MACLUSKY, J. MORRISON and J. N. WATSON	1
Autogenous toxoid vaccine in the prophylaxis of staphylococcal mastitis in cattle. J. K. L. Pearson	9
Influence of temperature treatment and season on the dilatometric behaviour of butterfat. J. M. DE MAN and F. W. WOOD	17
Steam distillation of taints from cream. IV. Vapour/liquid equilibrium relationships for mesityl oxide and some α -diketones as possible reference substances. F. H. McDowall	24
Steam distillation of taints from cream. V. Vapour/liquid equilibrium relationships for some α -diketones in lactose solution. F. H. McDowall .	33
Steam distillation of taints from cream. VI. Butterfat/lactose-solution distribution coefficients of some reference substances. F. H. McDowall	39
Steam distillation of taints from cream. VII. Butterfat/water distribution coefficients in relation to vapour/liquid equilibrium coefficients for tainting substances in cream. F. H. McDowall	46
The reaction of lactose with anthrone and its application to the estimation of lactose in casein and other dairy products. E. L. RICHARDS	53
Physical changes in milk caused by the action of rennet. IV. Effects of varying rennet concentration and temperature. G. W. Scott Blair and J. Burnett	58
Further studies on unrestricted whey for fattening pigs including the effect of omitting antibiotic from the diet during the later stages of fattening.	
R. Braude, K. G. Mitchell, A. S. Cray, A. Franke and P. H. Sedgwick Heat resistance of lactobacilli from English Cheddar cheese. K. D. Perry and M. Elisabeth Sharpe	63 72
Microscopical observations on Cheddar cheese and curd. Marion R. Dean, N. J. Berridge and L. A. Mabbitt	77
The estimation of the total solids and solids-not-fat of milk from the density and fat content. S. J. Rowland and A. W. Wagstaff	83
REVIEWS OF THE PROGRESS OF DAIRY SCIENCE: Section F. Milk-borne disease. J. Smith	88

iv Contents

No. 2 (June 1959)

Original Articles:	PAGE
Making Cheddar cheese on a small scale under controlled bacteriological conditions. L. A. Mabbitt, Helen R. Chapman and M. Elisabeth Sharpe	105
Steam distillation of taints from cream. VIII. Effect of fat content of dairy product on deodorization process. F. H. McDowall	113
Factors influencing the lactic acid-producing properties of streptococci used in the manufacture of Cheddar cheese. II. Observations relating susceptibility with insusceptibility. G. R. Jago and M. F. Swinbourne.	123
Citric acid content of milk in Manitoba. A. Reinart and J. M. Nesbitt	128
The composition of sow's milk during lactation with particular reference to the relationship between protein and lactose. G. A. Lodge	134
Observations by anoptral contrast microscopy of casein in milk, condensed milk and milk powder. N. King	140
Physical changes in milk caused by the action of rennet. V. Effects of varying concentrations of milk powder and of low-temperature pretreatment. G. W. Scott Blair and J. Burnett	144
A proposed method for the rapid determination of lactose in separated milk and condensed whey by infra-red absorption. J. D. S. GOULDEN	151
Lactobacilli in Cheddar cheese. C. K. Johns and Shirley E. Cole	157
Studies of the secretion of milk of low fat content by cows on diets low in hay and high in concentrates. VII. The effect of administration of volatile fatty acids to cows giving normal milk and milk of low fat content. C. C. Balch and S. J. Rowland	162
The effect on milk composition of feeding spring grass to cows. R. Waite, M. E. Castle and J. N. Watson	173
Relations between composition and viscosity of cow's milk. C. P. Cox, Zena D. Hosking and L. N. Posener	182
Isolation and identification of the high molecular weight saturated fatty acids of butterfat. R. P. Hansen, F. B. Shorland and N. June Cooke .	190
Oestrogens in British pasture plants. G. S. Pope, Mary J. McNaughton and H. E. H. Jones	196
The effect of heat on the vitamin B_6 of milk. I. Microbiological tests. Margaret E. Gregory	203
The effect of heat on the vitamin B ₆ of milk. II. A comparison of biological and microbiological tests of evaporated milk. Mary K. Davies, Margaret E. Gregory and Kathleen M. Henry	215

Contents

No. 3 (OCTOBER 1959)

Original Articles:	PAGE
An analysis of the performance of an ultra-high-temperature milk sterilizing plant. IV. Comparison of experimental and calculated sporicidal effects for a strain of <i>Bacillus stearothermophilus</i> . H. Burton, J. G. Franklin, D. J. Williams, Helen R. Chapman, A. Jean W. Harrison and L. F. L. Clegg	221
Some observations on slow and fast acid-producing variants of strains of Streptococcus cremoris and Str. lactis used as cheese starters. Ellen I. Garvie	227
A comparison of dried skim-milk and white fish meal as protein supplements for fattening pigs. IV. Further studies with pigs fed unrestricted amounts of whey under commercial conditions. R. Braude, K. G. MITCHELL, A. S. Cray, A. Franke and P. H. Sedgwick.	238
Viscosity changes in concentrated skim-milk treated with alkali, urea and calcium-complexing agents. I. The importance of the casein micelle. R. Beeby and K. Kumetat	248
Viscosity changes in concentrated skim-milk treated with alkali, urea and calcium-complexing agents. II. The influence of concentration, temperature and rate of shear. R. Beeby and J. W. Lee	258
Some volatile compounds in New Zealand Cheddar cheese and their possible significance in flavour formation. I. Identification of the volatile carbonyl fraction. J. R. L. Walker and R. J. Harvey	265
Some volatile compounds in New Zealand Cheddar cheese and their possible significance in flavour formation. II. Volatile compounds of sulphur. J. R. L. WALKER	273
Partition of riboflavin in cow's milk. V. V. Modi, E. C. Owen and R. A. Darroch	277
The use of an oxidation-reduction indicator to compare the oxygen permeabilities of films for rindless cheese. R. M. Dolby	281

DIRECTIONS TO CONTRIBUTORS

GENERAL. The onus of preparing a paper in a form suitable for publication in the *Journal of Dairy Research* lies in the first place with the author. In their own interests authors are strongly advised to follow these directions carefully and to consult a current issue for guidance on details of layout and use of headings.

Typescripts may be sent to the Editors at any time, and submission of a paper will be held to imply that it reports unpublished original work which is not under consideration

for publication elsewhere.

FORM OF PAPERS. Papers should be typed with double spacing, and the title followed by the names and initials of the authors, women supplying one Christian name. The name and postal address of the laboratory must be stated.

Papers should be divided into the following parts in the order indicated: (a) Summary, brief and self-contained; (b) Introductory paragraphs, briefly explaining the object of the work but without giving an extensive account of the literature; (c) Experimental or Methods; (d) Results; (e) Discussion and Conclusions; (f) Acknowledgements without a heading; (g) References. Only with some exceptional types of material will headings different from (c), (d) and (e) be necessary.

The spelling adopted is that of the Shorter

The spelling adopted is that of the Shorter Oxford English Dictionary. Underlining should be used only to indicate italics. Every effort should be made to avoid the use of footnotes. Proper nouns, including trade names, should be

given a capital initial letter.

Tables. Each table should be numbered and should have a heading that enables its contents to be understood without reference to the text. Tables must be typed on separate sheets and their approximate positions indicated in the text.

ILLUSTRATIONS. Line drawings, which must be originals, should be numbered as Figures and photographs as Plates, in Arabic numerals. Drawings should be in indian ink, on Bristol board or cartridge paper. However, a technique which may be more convenient to authors is to use a double-sized piece of tracing paper, or translucent graph paper faintly lined in blue or grey, folded down the centre with the drawing on one half and the other acting as a flyleaf.

Attached to every figure and plate there should be a translucent flyleaf cover on the outside of which should be written legibly: (a) title of paper and name of author; (b) figure or plate number and explanatory legend; (c) the figures and lettering, which is intended to appear on the finished block, in the correct position relative to the drawing underneath. For each paper there should also be a separate typed sheet listing figure and plate numbers

with their legends, and the approximate position of illustrations should be indicated in the text.

As a rule the photographs and diagrams should be about twice the size of the finished block and not larger over-all than the sheets on which the paper itself is typed. For general guidance in preparing diagrams, it is suggested that for a figure measuring 9 in. \times 6 in. all lines, axes and curves, should have a thickness of 0.4 mm, thus -—. Graph symbols in order of preference should be \bigcirc \bullet , \triangle \blacktriangle , \square \blacksquare , \times +, and for a 9 in. \times 6 in. graph the open circles should be $\frac{1}{8}$ in. in diameter. The open triangles should be large enough to contain circles of $\frac{1}{16}$ in. diameter and the open squares circles of $\frac{1}{6}$ in. diameter. The crosses should have lines in. long. The block symbols should be slightly smaller than the corresponding open symbols. Scale marks on the axes should be on the inner side of each axis and should be \frac{1}{8} in. long.

REFERENCES. In the text references should be quoted by whichever of the following ways is appropriate; Arnold & Barnard (1900); Arnold & Barnard (1900a, b); (Arnold & Barnard, 1900). Where there are more than two authors all the surnames should be quoted at the first mention, but in subsequent citations only the first surname should be given thus, Brown et al. (1901). If there are six or more names, use et al. in first instance. Also, if the combinations of names are similar, repeat names each time, e.g. Brown, Smith & Allen (1954); Brown, Allen & Smith (1954).

References should be listed alphabetically at the end of the paper, titles of journals being abbreviated as in the World List of Scientific Periodicals. Authors' initials should be included, and each reference should be punctuated in the typescript thus: Arnold, T. B., Barnard, R. N. & Compound, P. J. (1900). J. Dairy Res. 18, 158. References to books should include name of author, year of publication, title, town of publication and name of publisher in that order, thus, Arnold, T. B. (1900). Dairying. London: Brown and Chester.

It is the duty of the author to check all references and to ensure that the correct abbreviations are used.

SYMBOLS AND ABBREVIATIONS. The symbols and abbreviations used are those of British Standard 1991: Part 1: 1954, Letter Symbols, Signs and Abbreviations.

DESCRIPTIONS OF SOLUTIONS. Normality and molarity should be indicated thus: N-HCl, 0·1 M-NaH₂PO₄. The term '%' means g/100 g solution. For ml/100 ml solution write '% (v/v)' and for g/100 ml solution write '% (w/v)'.

REPRINTS. Order forms giving quotations for reprints are sent to authors with their proofs.

CONTENTS OF VOL. 26, No. 3

Original Articles	PAGE
An analysis of the performance of an ultra-high-temperature milk sterilizing plant. IV. Comparison of experimental and calculated sporicidal effects for a strain of <i>Bacillus stearothermophilus</i> . H. Burton, J. G. Franklin, D. J. Williams, Helen R. Chapman, A. Jean W. Harrison and L. F. L. Clegg	221
Some observations on slow and fast acid-producing variants of strains of Streptococcus cremoris and Str. lactis used as cheese starters. Ellen I. Garvie	227
A comparison of dried skim-milk and white fish meal as protein supplements for fattening pigs. IV. Further studies with pigs fed unrestricted amounts of whey under commercial conditions. R. Braude, K. G. Mitchell, A. S. Cray, A. Franke and P. H. Sedgwick	238
Viscosity changes in concentrated skim-milk treated with alkali, urea and calcium-complexing agents. I. The importance of the casein micelle. R. Beeby and K. Kumetat	248
Viscosity changes in concentrated skim-milk treated with alkali, urea and calcium-complexing agents. II. The influence of concentration, temperature and rate of shear. R. Beeby and J. W. Lee	258
Some volatile compounds in New Zealand Cheddar cheese and their possible significance in flavour formation. I. Identification of the volatile carbonyl fraction. J. R. L. Walker and R. J. Harvey	265
Some volatile compounds in New Zealand Cheddar cheese and their possible significance in flavour formation. II. Volatile compounds of sulphur. J. R. L. Walker	278
Partition of riboflavin in cow's milk. V. V. Modi, E. C. Owen and R. A. Darroch	277
The use of an oxidation-reduction indicator to compare the oxygen permeabilities of films for rindless cheese. R. M. Dolby	281

Notice. Would contributors please note that new Directions to Contributors are printed on the inside of the back cover. These directions imply considerable alterations to layout and details of papers written for the Journal of Dairy Research, and it would greatly assist the Editors if all papers to be submitted after June 1959 were prepared in accordance with the new directions.

Printed in Great Britain at the University Press, Cambridge (Brooke Crutchley, University Printer)