

## INDIAN JOURNAL OF DAIRY SCIENCE

Volume XXX, No. 1

CONTENTS

March, 1977

1. Effect of antioxidants and antimicrobial substances on keeping quality of khoa by Y. K. JHA, S. SINGH and SURJAN SINGH
2. Voluminosity of casein micelles in chilled milk from buffalo and cow by S. M. SOOD, K. S. SIDHU and R. K. DEWAN
3. Viscometric study of interaction between the major milk constituents in model milk systems. II. Role of minerals cations by P. L. YADAV and N. K. ROY
4. Heat stability of buffalo milk in relation to compositional factors by BALWANT RAI PURI, HARI NARAIN, UMA JOSHI and S. K. VERMA
5. Effect of exchange of calcium by sodium in the caseinate complex on heat stability of buffalo milk by BALWANT RAI PURI, HARI NARAIN and S. K. VERMA
6. Rapid detection and estimation of extraneous glucose in milk and effects of the adulterant on certain physico-chemical properties of buffalo milk by N. K. ROY and S. B. MITTAL
7. Pathogenic bacterial flora of raw market milk by D. N. GARG, D. N. BHARGAVA and K. G. NARAYAN
8. Efficacy of some chemotherapeutic agents in the treatment of bovine mastitis by S. D. SHARMA and P. RAI
9. Jute (*Corchorus olitorius*) leaf hay as a partial growth production feed substitute for Sindhi cattle by B. N. GUPTA and R. C. SAHA
10. Relative feed efficiency of crossbred cow at equal level of milk production by KRIPAL SINGH, K. PRADHAN and D. S. BALAINE
11. Influence of dietary citrate in rumen development of Karan-Swiss calves by V. LEELA PRASAD and S. P. ARORA
12. Inheritance of age at first calving and its correlation with first lactation milk production in crossbred cattle by S. B. BASU and A. S. GHAI

### *Short Communications*

Price: Rs. 40/- (\$10.00 or £4.00) per annum.

Published by:

Indian Dairy Association, IDA House,  
Sector IV, R.K. Puram, New Dehli 110022,  
INDIA

# MACHINE MILKING

This monograph provides an assessment of current knowledge for research workers, manufacturers, advisers, veterinarians, students and farmers. Each chapter is substantially complete in itself, and written at a technical level to suit the nature of the material.

*Edited by:* C. C. Thiel and F. H. Dodd

*Contents (390 pages, 170 illustrations)*

- Chap. I History and development H. S. HALL  
II Basic mechanics H. S. HALL  
III Description and performance of components D. N. AKAM  
IV Maintenance and mechanical testing H. S. HALL  
V Action of the cluster during milking C. C. THIEL and  
G. A. MEIN  
VI Anatomy and physiology of the udder A. T. COWIE  
VII Milking routines F. H. DODD and T. K. GRIFFIN  
VIII Machine milking in cowsheds and milking parlours  
P. A. CLOUGH  
IX Machine milking and mastitis R. G. KINGWILL, F. H.  
DODD and F. K. NEAVE  
X Cleaning and disinfection in milk production  
CHRISTINA M. COUSINS and C. H. MCKINNON  
XI Rubber and the milking machine J. G. ANDERSON and  
L. J. COOMBS  
XII Milk cooling equipment J. B. HOYLE

*Published by:* The National Institute for Research in Dairying, Reading,  
England

*Price, including postage: £6 (US \$10) single copies*  
*£4.80 (US \$8) for 5 or more copies*  
*Cash with order please*

*from: The Librarian*  
*N.I.R.D.*  
*Shinfield*  
*Reading RG2 9AT*  
*England*

# JOURNAL OF DAIRY RESEARCH

EDITED BY

M. ELISABETH SHARPE, PH.D., D.Sc., F.I.BIOL

National Institute for Research in Dairying,  
Shinfield, Reading, Berkshire, RG2 9AT

A. K. MARTIN, PH.D., A.R.I.C.

The Hannah Research Institute, Ayr, KA6 5HL

*Assistant Editors*

A. T. ANDREWS, M.A., D.Phil.

B. F. BONE, B.A., A.L.A., A.I.Inf.Sc.

L. W. PHIPPS, B.Sc., Ph.D.

*Editorial Assistant*

MRS DOROTHY SKIDMORE

*Secretary*

J. C. F. COLES

VOLUME 44, 1977

CAMBRIDGE UNIVERSITY PRESS

PUBLISHED BY  
THE SYNDICS OF THE CAMBRIDGE UNIVERSITY PRESS

The Pitt Building, Trumpington Street, Cambridge, CB2 1RP  
Bentley House, 200 Euston Road, London, NW1 2DB  
32 East 57th Street, New York, N.Y. 10022

*Printed in Great Britain at the University Press, Cambridge*

## Contents

No. 1 (February 1977)

|  | PAGE |
|--|------|
| Relationships between blood composition and fertility in dairy cows – a field study. G. J. ROWLANDS, W. LITTLE and B. A. KITCHENHAM . . . . .  | 1    |
| Influence of age, dietary protein and weaning on calf abomasal enzymic secretion. P. GARNOT, R. TOULLEC, J.-L. THAPON, P. MARTIN, MINH-THU HOANG, C.-M. MATHIEU and B. RIBADEAU-DUMAS . . . . .        | 9    |
| A method of diagnosing intramammary infection in dairy cows for large experiments. T. K. GRIFFIN, F. H. DODD, F. K. NEAVE, D. R. WESTGARTH, R. G. KINGWELL and C. D. WILSON . . . . .                  | 25   |
| Disinfection properties of some bovine teat dips. J. S. KING, F. K. NEAVE and D. R. WESTGARTH . . . . .  | 47   |
| Studies on milk yield and composition of the West African dwarf goat in Nigeria. A. O. AKINSOYINU, A. U. MBA and F. O. OLUBAJO . . . . .   | 57   |
| Fractionation of whole casein on hydroxyapatite. Application to a buffalo $\kappa$ -casein. F. ADDEO, J.-M. CHOBERT and B. RIBADEAU-DUMAS . . . . .  | 63   |
| Isoelectric focusing of milk-clotting enzymes. P. G. RIGHETTI, B. M. MOLINARI and G. MOLINARI . . . . .  | 69   |
| Quantification of milk-clotting enzymes in 40 commercial bovine rennets, comparing rocket immunoelectrophoresis with an activity ratio assay. G. A. L. ROTHE, M. J. HARBOE and S. C. MARTINY . . . . . | 73   |
| The potential application of the theory of branching processes to the association of milk protein. T. G. PARKER and D. G. DALGLEISH . . . . .  | 79   |
| The theory of branching processes applied to milk proteins. I. Heat-induced coagulation of whole milk. T. G. PARKER and D. G. DALGLEISH . . . . .  | 85   |
| Water vapour sorption properties of dried milk baby foods. N. N. VARSHNEY and T. P. OJHA . . . . .   | 93   |
| Thermal conductivity of creams. F. FERNANDEZ-MARTÍN and F. MONTES . . . . .  | 103  |
| Changes during storage in stability and composition of ultra-heat-treated aseptically-packed cream of 18% fat content. M. ANDERSON, B. E. BROOKER, T. E. CAWSTON and G. C. CHEESEMAN . . . . .         | 111  |
| Quantitative analysis of food products by pulsed nuclear magnetic resonance. II. Simultaneous analysis of water and fat in milk powder and cottage cheese. R. E. HESTER and D. E. C. QUINE . . . . .   | 125  |

|   | PAGE |
|---|------|
| The presence of thyroxine in bovine precolostrum and colostrum. T. GREGA and S. BOBEK . . . . .   | 131  |
| The thickness and refractive index of milk-fat globule membrane as determined by ellipsometry. K. R. LANGLEY . . . . .  | 133  |
| Formation of acetaldehyde from 2-deoxy-D-ribose-5-phosphate by lactic acid bacteria. G. J. LEES and G. R. JAGO . . . . .  | 139  |
| Gelation of ultra-high-temperature-sterilized milk by proteases from a strain of <i>Pseudomonas fluorescens</i> isolated from raw milk. B. A. LAW, A. T. ANDREWS and M. E. SHARPE . . . . . | 145  |
| The microbiology of pickled cheese during manufacture and maturation. Y. YANAI, B. ROSEN, A. PINSKY and D. SKLAN . . . . .  | 149  |
| Effect of fruit on growth of <i>Lactobacillus bulgaricus</i> and <i>Streptococcus thermophilus</i> . P. THORNHILL and T. M. COGAN . . . . .   | 155  |
| Review of the progress of Dairy Science: milk coagulants. M. L. GREEN . . . . .   | 159  |

### No. 2 (June 1977)

|   |     |
|---|-----|
| Obituary: Emeritus Professor H. D. Kay, C.B.E. Ph.D. (Cantab), D.Sc. (Manchester), F.R.S. . . . . .   | 191 |
| Estimation of the prevalence of udder infection in dairy herds based on a single-quarter sample from each cow in the dairy herd. G. P. Y. CLARKE and J. OLIVER . . . . .  | 195 |
| The concentration of lactate in relation to other components of bovine mammary secretion during premature regression and after resumption of milking. R. I. MACKIE, W. H. GIESECKE, H. LÜCK and P. A. DE VILLIERS . . . . . | 201 |
| An improved method for the quantitative fractionation of casein mixtures using ion-exchange chromatography. D. T. DAVIES and A. J. R. LAW . . . . .   | 213 |
| Progressive changes in individual milk protein concentrations associated with high somatic cell counts. M. ANDERSON and A. T. ANDREWS . . . . .   | 223 |
| Kinetics of the heat-induced aggregation of milk protein. J. C. D. WHITE and A. W. M. SWEETSUR . . . . .  | 237 |
| Effect of urea on the heat coagulation of the caseinate complex in skim-milk. D. D. MUIR and A. W. M. SWEETSUR . . . . .  | 249 |
| Chemical changes in ultra-heat-treated milk during storage. I. Hydrolysis of casein by incubation with pronase and peptidase mixture. A. B. MÖLLER, A. T. ANDREWS and G. C. CHEESEMAN . . . . .                             | 259 |
| Chemical changes in ultra-heat-treated milk during storage. II. Lactulose-lysine and fructoselysine formation by the Maillard reaction. A. B. MÖLLER, A. T. ANDREWS and G. C. CHEESEMAN . . . . .                           | 267 |

|   | PAGE |
|---|------|
| Chemical changes in ultra-heat-treated milk during storage. III. Methods for the estimation of lysine and sugar-lysine derivatives formed by the Maillard reaction. A. B. MÖLLER, A. T. ANDREWS and G. C. CHEESEMAN | 277  |
| Properties of aseptically packed ultra-heat-treated milk. Electron microscopic examination of changes occurring during storage. A. T. ANDREWS, B. E. BROOKER and D. G. HOBBS . . . . .                              | 283  |
| An examination of the factors affecting the reserve osmosis of milk with special reference to deposit formation. P. J. SKUDDER, F. A. GLOVER and M. L. GREEN . . . . .  | 293  |
| Dipeptide utilization by starter streptococci. B. A. LAW . . . . .  | 309  |
| Selective denaturation of milk coagulants in 5 M-urea. D. M. MULVIHILL and P. F. FOX . . . . .  | 319  |
| Seasonal variations of copper and iron in Irish milk and butter. J. J. MURPHY, D. R. HEADON and W. K. DOWNEY . . . . .  | 325  |
| Denaturation of porcine pepsin during Cheddar cheese manufacture. A. M. O'KEEFE, P. E. FOX and C. DALY . . . . .  | 335  |
| Electrical conductivity of milk from goats of the Beetal breed. G. S. SHARMA and N. K. ROY . . . . .  | 345  |
| Inverse relationship between the electrolyte concentration and the content of fat, protein, and lactose in the normal milks of individual cows from the same herd. M. OSHIMA and H. FUSE . . . . .                  | 347  |
| Effect of sulphhydryl-blocking agents on the primary phase of chymosin action on heated casein micelles and heated milk. S. I. SHALABI and J. V. WHEELLOCK . . . . .  | 351  |
| Cheddar cheese aroma – the effect of selectively removing specific classes of compounds from cheese headspace. D. J. MANNING and J. C. PRICE . . . . .  | 357  |
| Observations on the primary phase of milk coagulation by rennet under standardized conditions. KL. GUTHY and G. NOVAK . . . . .   | 363  |
| Effect of heat on $\alpha$ -lactalbumin and $\beta$ -lactoglobulin. A. A. ELFAGM and J. V. WHEELLOCK . . . . .  | 367  |
| A simple method for the isolation of a phosphopeptide from bovine $\alpha_{s1}$ -casein. D. W. WEST . . . . .   | 373  |
| Micro-determination of lead and cadmium in pasteurized market milks by flameless atomic absorption spectroscopy using a base digest. P. J. BARLOW . . . . .   | 377  |
| Reviews of the progress of Dairy Science: bovine salmonellosis. C. WRAY and W. J. SOJKA . . . . .   | 383  |

## No. 3 (October 1977)

|   | PAGE |
|---|------|
| Effect of thiocyanate on mammary gland growth in rats. H. PYSKA . . . . .   | 427  |
| Mammary blood flow during experimental <i>Escherichia coli</i> endotoxin induced mastitis in goats and cows. G. DHONDT, C. BURVENICH and G. PEETERS . . . . .                       | 433  |
| Metabolic pathways of cytoplasmic droplets from freshly secreted goat's milk. R. G. VERNON and W. W. CHRISTIE . . . . .   | 441  |
| The composition of whole casein from the milk of Ayrshire cows. D. T. DAVIES and A. J. R. LAW . . . . .   | 447  |
| The caseins of buffalo milk. F. ADDEO, J.-C. MERCIER and B. RIBADEAU-DUMAS . . . . .  | 455  |
| Fractionation and characterization of the membranes from bovine milk fat globules. B. J. KITCHEN . . . . .  | 469  |
| Milk-fat globule membranes: chemical composition and phosphoesterase activities during lactation. T. DIAZ-MAURINO and M. NIETO . . . . .  | 483  |
| The oxidation of lipids by components of bovine milk-fat globule membrane. J. C. ALLEN and C. HUMPHRIES . . . . .   | 495  |
| A calorimetric study of the thermal denaturation of whey proteins in simulated milk ultrafiltrate. M. RÜEGG, U. MOOR and B. BLANC . . . . .   | 509  |
| The acceleration by cationic materials of the coagulation of casein micelles by rennet. M. L. GREEN and R. J. MARSHALL . . . . .  | 521  |
| Proteolysis of $\alpha_{s1}$ -casein by chymosin: influence of pH and urea. D. M. MULVIHILL and P. F. FOX . . . . .   | 533  |
| Hydrolysis of lactose in milk and whey with minute amounts of lactase. A. DAHLQVIST, N.-G. ASP, A. BURVALL and H. RAUSING . . . . .   | 541  |
| Nutritional value of lactose-hydrolysed milk: protein quality after some industrial processes. A. BURVALL, N.-G. ASP, A. DAHLQVIST and R. ÖSTE . . . . .                            | 549  |
| The role of various milk fractions and the importance of somatic cells in the formation of germinant(s) for <i>Bacillus cereus</i> when milk is pasteurized. F. L. DAVIES . . . . . | 555  |
| Some factors involved in milk lipase activation by agitation. H. C. DEETH and C. H. FITZ-GERALD . . . . .   | 569  |
| The relationship between herd bulk milk composition and cell count in commercial dairy herds. C. B. ASBY, R. P. GARD and J. H. WATKINS . . . . .                                    | 585  |
| The effect of intergroup movement of dairy cows on bulk-milk somatic cell numbers. S. J. KAY, K. A. COLLIS, J. C. ANDERSON and A. J. GRANT . . . . .                                | 589  |
| The isolation and bacteriostatic properties of lactoferrin from bovine milk whey. B. A. LAW and B. REITER . . . . .   | 595  |



*Contents*

vii

|  | PAGE |
|--|------|
| The determination of short- and long-chain free fatty acids in milk. A. M. A. SALIH, M. ANDERSON and B. TUCKLEY . . . . .          | 601  |
| The proteins and salts of some non-bovine milks. P. O'CONNOR and P. F. FOX . . . . .   | 607  |
| Rigidity modulus as a factor influencing the syneresis of renneted milk gels. J. LELIEVRE . . . . .                                | 611  |
| Evaluation of some coated titanium electrodes for measurements of conductivity of milk and milk products. J. H. PRENTICE . . . . . | 615  |
| Chromatography of milk proteins on hydroxyapatite. W. J. DONNELLY . . . . .  | 621  |
| Reviews of the progress of Dairy Science: the heat stability of milk. P. F. FOX and P. A. MORRISSEY . . . . .                      | 627  |

## Index of Subjects

- Abomasum**, enzyme secretion, age, dietary protein, weaning, influence, calves, 9
- Acetaldehyde**, from 2-deoxyribose-5-phosphate, lactic acid bacteria, 139
- Age**, enzyme secretion, abomasum, calves, 9
- Aroma**, Cheddar cheese, effect of removing compounds from headspace, 357
- Bacillus cereus***, germinant, somatic cells, milk, relationship, 555
- Bacteria**, detection, mammary gland, large experiments, 25
- Blood**, composition, fertility, relationship, 1
- Buffalo(es)**, milk, caseins, 455  
 $\kappa$ -casein, fractionation, 63
- Butter**, *see also* Milk fat  
 Irish, copper, iron, contamination, 325
- Butterfat**, *see* Milk fat
- Cadmium**, milk, determination, atomic absorption spectroscopy, 377
- Casein**, micelles, heated, rennin, action, effect of sulphhydryl-blocking agents, 351  
 rennet, action, acceleration by cationic materials, 521  
 mixtures, fractionation, chromatography, 213  
 UHT milk, stored, enzymic hydrolysis, 259, 267, 277  
 micelles, changes, electron microscopic study, 283  
 whole, composition, milk, buffalo, 455  
 cow, 447
- $\alpha_{s1}$ -Casein, phosphopeptide, isolated from, 373  
 proteolysis, rennin, effect of pH, urea, 533
- $\kappa$ -Casein, fractionation, buffalo's milk, 63
- Cell count**, germinant formation, *Bacillus cereus*, relationship, pasteurization, 555  
 intergroup movement, cows, effect of, 589  
 milk composition, relationship, 585
- Cheddar cheese**, aroma, effect of removing compounds from headspace, 357  
 production, porcine pepsin, denaturation, 335
- Cheesemaking** - *see also* Cheddar cheese  
 coagulants (review), 159  
 pickled cheese, microbiological changes, 149  
 starter, *see* Starters
- Cheese ripening**, pickled cheese, microbiological changes, 149
- Chromatography**, hydroxyapatite, milk proteins, 621
- Chymosin**, *see* Rennin
- Coagulation**, coagulants, denaturation, 5 M-urea, 319  
 (review), 159  
 milk proteins, heated, kinetics, 237  
 (review), 627  
 theory of branching processes, 79, 85  
 urea content of milk, influence, 249  
 rennet, standardized conditions, 363
- Concentration**, milk, reverse osmosis, factors affecting, 293
- Conductivity**, milk, milk products, measurement, coated titanium electrodes, 615
- Copper**, contamination, Irish-milk, -butter, 325
- Cottage cheese**, water-, fat-content, nuclear magnetic resonance technique, 125
- Cream**, homogenized, UHT, aseptically-packed, changes, storage, 111  
 thermal conductivity, 103
- Dairy products**, *see also individual products*  
 conductivity, measurement, coated titanium electrodes, 615  
 quantitative analysis, nuclear magnetic resonance technique, 125
- 2-Deoxyribose-5-phosphate**, precursor of acetaldehyde, lactic acid bacteria, 139
- Diet**, protein type, enzyme secretion, abomasum, calves, 9
- Dipeptide**, utilization, starters, 309
- Diseases**, *see* Mastitis, Salmonellosis
- Dried milk**, baby foods, water vapour sorption, 93  
 water-, fat-content, nuclear magnetic resonance technique, 125
- Enzymes**, *see also* Lactase, Lipase, Pepsin, Peptidase, Pronase, Proteases, Rennet, Rennin  
 milk-clotting, bovine rennets, 85  
 isoelectric focusing, 69  
 (review), 159
- Escherichia coli***, endotoxin mastitis, mammary blood flow, 433
- Fatty acids**, determination, milk, 601
- Fertility**, blood composition, relationship, 1
- Fructoselysine**, formation, UHT milk, stored, 267
- Fruit purées**, stimulation, growth, *Lactobacillus bulgaricus*, *Streptococcus thermophilus*, 155
- Gelation**, UHT milk, proteases, *Pseudomonas fluorescens*, 145
- Goat(s)**, milk, cytoplasmic droplets, metabolic pathways, 441  
 electrical conductivity, 345  
 -yield, -composition, Nigeria, 57
- Heat stability**, *see* Coagulation, milk proteins, heated
- Heat treatment**, *see also* Pasteurization and Sterilization  
 milk,  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin, effect on, 367  
 rennin action, effect of sulphhydryl-blocking agents, 351  
 simulated milk ultrafiltrate, denaturation, whey proteins, 509

**Hormones, see Thyroxine**

**Hydroxyapatite**, chromatographic medium, milk proteins, 621

**Infant feeding**, dried milk, water vapour sorption, 93

**Iron**, contamination, Irish-milk, -butter, 325

**Kay, H. D.**, obituary, 191

 **$\alpha$ -Lactalbumin, see also Whey proteins**

in milk, effect of heat, 367

**Lactase**, milk lactose, hydrolysis, 541, 549

**Lactate**, concentration, mammary secretion, 201

**Lactation**, stage, milk-fat globule membrane, chemical composition, phosphoesterase activities, 483

**Lactic acid bacteria**, acetaldehyde formed, from 2-deoxyribose-5-phosphate, 139

**Lactobacillus bulgaricus**, growth, stimulation, fruit purées, 155

**Lactoferrin**, milk whey, isolation, properties, 595

 **$\beta$ -Lactoglobulin, see also Whey proteins**

in milk, effect of heat, 367

**Lactose**, milk, electrolyte concentration, inverse relationship, 347

hydrolysis, lactase, 541

nutritional protein quality, 549

**Lactuloselysine**, formation, UHT milk, stored, 267

**Lead**, milk, determination, atomic absorption spectroscopy, 377

**Lipase**, activation, milk, agitation, 569

**Lipid(s)**, metabolism, study, cytoplasmic droplets, goat's milk, 441

oxidation, milk-fat globule membrane, 495

**Lipolysis**, lipase activation, by agitation, 569

**Lysine**, sugar-lysine, estimation, UHT milk, stored, 277

**Maillard reaction**, UHT milk, stored, 267, 277

**Mammary gland**, blood flow, *Escherichia coli* endotoxin mastitis, 433

infection, detection, large experiments, 25

single-quarter sampling, 195

milk proteins, changes, 223

lactate concentration, premature regression, resumption of milking, 201

rats, effect of thiocyanate, 427

**Mastitis**, *Escherichia coli* endotoxin induced, mammary blood flow, 433

**Milk**, cell count, germinant formation, *Bacillus cereus*, relationship, pasteurization, 555

intergroup movement, cows, effect of, 589

coagulation, see **Coagulation**

concentration, reverse osmosis, factors affecting, 293

conductivity, measurement, coated titanium electrodes, 615

contamination, lead, cadmium, determination, atomic absorption spectroscopy, 377

goat, cytoplasmic droplets, metabolic pathways, 441

electrical conductivity, 345

heated,  $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin, effect on, 367

rennin action, effect of sulphhydryl-blocking agents, 351

Irish, copper, iron, contamination, 325

lactose-hydrolysed, nutritional protein quality, 549

lipase activation, by agitation, 569

rennet, action, primary phase, standardized conditions, 363

UHT sterilization, changes, storage, 259, 267, 277, 283

proteases, gelation, 145

**Milk composition**, cell count, relationship, 585

electrolyte concentration, inverse relationship, 347

goat, Nigeria, 57

non-bovine, proteins, salts, 607

thyroxine content, 131

UHT sterilized, stored, 259, 267, 277, 283

**Milk fat**, breakdown, see **Lipolysis**

electrolyte concentration, inverse relationship, 347

free fatty acids, determination, 601

globule, changes, UHT milk, stored, electron microscopic study, 283

membrane, chemical composition, phosphoesterase activities, lactation, 483

fractionation, 469

lipids, oxidation, 495

thickness, refractive index, 133

**Milk Powder, see Dried milk****Milk protein(s), see also Fructoselysine, Lactoferrin, Lactuloselysine, Lysine, Proteins, Whey proteins**

breakdown, see **Proteolysis**

changes, high cell count, milk, 223

chromatography, hydroxyapatite, 621

coagulation, theory of branching processes, 79, 85

electrolyte concentration, inverse relationship, 347

heat stability, kinetics, 237

(review), 627

urea content of milk, influence, 249

non-bovine milks, 607

nutritional value, lactose-hydrolysed milk, 549

**Milk yield**, goats, Nigeria, 57**Nigeria**, goats, milk-yield, -composition, 57**Pasteurization, see also Heat Treatment**

germinant(s) for *Bacillus cereus*, formation, 555

**Pepsin**, porcine, denaturation, Cheddar cheese manufacture, 335

secretion, abomasum, calves, 9

**Peptidase**, hydrolysis, casein, UHT milk, stored, 259

**Pickled cheese**, microbiology, manufacture, maturation, 149

**Pronase**, hydrolysis, casein, UHT milk, stored, 259

- Proteases**, *Pseudomonas fluorescens*, gelation, UHT milk, 145
- Proteins**, *see also* Milk proteins  
 type, diet, enzyme secretion, abomasum, calves, 9  
 whey, *see* **Whey proteins**
- Proteolysis**, casein, UHT milk, stored, 259, 267, 277, 283  
 $\alpha_1$ -casein, rennin, effect of pH, urea, 533
- Pseudomonas fluorescens***, proteases, gelation, UHT milk, 145
- Rennet(s)**, bovine, milk-clotting enzymes, 73  
 calf, substitutes, isoelectric focusing, 69  
 coagulation, casein micelles, acceleration by cationic materials, 521  
 milk, gels, syneresis, influence of rigidity, 611  
 primary phase, standardized conditions, 363  
 denaturation, 5 M-urea, 319
- Rennin**, action, milk, casein micelles, heated, effect of sulphhydryl-blocking agents, 351  
 proteolysis,  $\alpha_1$ -casein, effect of pH, urea, 533  
 secretion, abomasum, calves, 9
- Salmonellosis** (review), 383
- Salts**, content, non-bovine milks, 607
- Skim-milk**, heat stability, urea content, influence, 249
- Starters**, dipeptide utilization, 309
- Sterilization**, UHT, cream, changes after storage, 111  
 milk, changes after storage, 259, 267, 277, 283  
 gelation, proteases, *Pseudomonas fluorescens*, 145
- Storage**, cream, homogenized, UHT, aseptically-packed, changes, 111  
 milk, UHT sterilized, changes, 259, 267, 277, 283
- Streptococcus thermophilus***, growth, stimulation, fruit purées, 155
- Syneresis**, renneted milk gels, rigidity, influence, 611
- Teat**, disinfectant dips, 47
- Thiocyanate**, mammary gland growth, rats, 427
- Thyroxine**, content, milk, 131
- Urea**, content, heat stability, skim-milk, 249
- Weaning**, enzyme secretion, abomasum, calves, 9
- Whey**, lactoferrin, isolation, properties, 595  
 lactose, hydrolysis, lactase, 541
- Whey proteins**, *see also* Lactalbumin, Lactoglobulin  
 thermal denaturation, simulated milk ultrafiltrate, 509

## Index of Authors

- ADDEO, F., 63, 455  
 AKINSOYINU, A. O., 57  
 ALLEN, J. C., 495  
 ANDERSON, J. C., 589  
 ANDERSON, M., 111, 223, 601  
 ANDREWS, A. T., 145, 223, 259, 267, 277, 283  
 ASBY, C. B., 585  
 ASP, N.-G., 541, 549  
  
 BARLOW, P. J., 377  
 BLANC, B., 509  
 BOBEK, S. 131  
 BROOKER, B. E., 111, 283  
 BURVALL, A., 541, 549  
 BURVENICH, C., 433  
  
 CAWSTON, T. E., 111  
 CHEESEMAN, G. C., 111, 259, 267, 277  
 CHOBERT, J.-M., 63  
 CHRISTIE, W. W., 441  
 CLARKE, G. P. Y., 195  
 COGAN, T. M., 155  
 COLLIS, K. A., 589  
  
 DAHLQVIST, A., 541, 549  
 DALGLEISH, D. G., 79, 85  
 DALY, C., 335  
 DAVIES, D. T., 213, 447  
 DAVIES, F. L., 555  
 DEETH, H. C., 569  
 DE VILLIERS, P. A., 201  
 DEHONDT, G., 433  
 DIAZ-MAURINO, TERESA, 483  
 DODD, F. H., 25  
 DONNELLY, W. J., 621  
 DOWNEY, W. K., 325  
  
 ELFAGM, A. A., 367  
  
 FERNÁNDEZ-MARTÍN, F., 103  
 FITZ-GERALD, C. H., 569  
 FOX, P. F., 319, 335, 533, 607, 627  
 FUSE, HIROSHI, 347  
  
 GARD, R. P., 585  
 GARNOT, P., 9  
 GIESECKE, W. H., 201  
 GLOVER, F. A., 293  
 GRANT, A. J., 589  
 GREEN, MARGARET L., 159, 293, 521  
 GREGA, T., 131  
 GRIFFIN, T. K., 25  
 GUTHY, KL., 363  
  
 HARBOE, M. K., 73  
 HEADON, D. R., 325  
 HESTER, R. E., 125  
 HOANG, MINH-THU, 9  
  
 HOBBS, D. G., 283  
 HUMPHRIES, CATHERINE, 495  
  
 JAGO, G. R., 139  
  
 KAY, SALLY J., 589  
 KING, J. S., 47  
 KINGWILL, R. G., 25  
 KITCHEN, B. J., 469  
 KITCHENHAM, B. A., 1  
  
 LANGLEY, K. R., 133  
 LAW, A. J. R., 213, 447  
 LAW, B. A., 145, 309, 595  
 LEES, G. J., 139  
 LELIEVRE, J., 611  
 LITTLE, W., 1  
 LÜCK, H., 201  
  
 MACKIE, R. I., 201  
 MANNING, D. J., 357  
 MARSHALL, R. J., 521  
 MARTIN, P., 9  
 MARTINY, S. C., 73  
 MATHIEU, C.-M., 9  
 MBA, A. U., 57  
 MERCIER, J.-C., 455  
 MOLINARI, BRUNA M., 69  
 MOLINARI, G., 69  
 MÖLLER, A. B., 259, 267, 277  
 MONTES, F., 103  
 MOOR, URSULA, 509  
 MORRISSEY, P. A., 627  
 MUTR, D. D., 249  
 MULVIHILL, D. M., 319, 533  
 MURPHY, J. J., 325  
  
 NEAVE, F. K., 25, 47  
 NIETO, M., 483  
 NOVAK, G., 363  
  
 O'CONNOR, P., 607  
 OJHA, T. P., 93  
 O'KEEFE, A. M., 335  
 OLIVER, J., 195  
 OLUBAJO, F. O., 57  
 OSHIMA MASAHARU, 347  
 ÖSTE, R., 549  
  
 PARKER, T. G., 79, 85  
 PEETERS, G., 433  
 PINSKY, A., 149  
 PORTER, J. W. G., 191  
 PRENTICE, J. H., 615  
 PRICE, J. C., 357  
 PYSKA, H., 427

*Index of Authors*

xiii

QUINE, D. E. C., 125

RAUSING, H., 541

REITER, B., 595

RIBADEAU-DUMAS, B., 9, 63, 455

RIGHETTI, P. G., 69

ROSEN, B., 149

ROTHER, G. A. L., 73

ROWLANDS, G. J., 1

ROY, N. K., 345

RÜEGG, M., 509

SALIH, A. M. A., 601

SHALABI, S. I., 351

SHARMA, G. S., 345

SHARPE, M. ELISABETH, 145

SKLAN, D., 149

SKUDDER, P. J., 293

SOJKA, W. J., 383

SWEETSUR, A. W. M., 237, 249

THAPON, J.-L., 9

THORNHILL, P., 155

TOULLEC, R., 9

TUCKLEY, B., 601

VARSHNEY, N. N., 93

VERNON, R. G., 441

WATKINS, J. H., 585

WEST, D. W., 373

WESTGARTH, D. R., 25, 47

WHEELLOCK, J. V., 351, 367

WHITE, J. C. D., 237

WILSON, C. D., 25

WRAY, C., 383

YANAI, Y., 149



## DIRECTIONS TO CONTRIBUTORS

### GENERAL

Two copies of manuscripts should be sent to Dr M. E. Sharpe (*The Journal of Dairy Research*), National Institute for Research in Dairying, Shinfield, Reading, RG2 9AT, England. Submission of a paper will be held to imply that it reports unpublished original work, that it is not under consideration for publication elsewhere, and that if accepted for the *Journal* it will not be published elsewhere in any language, without the consent of the Editors.

### FORM OF PAPERS

The author should follow these directions carefully, and consult a current issue of the *Journal* for guidance on details of typographical and other conventions.

Every paper should be headed with its title, the names and initials of the authors (women supplying one given name) and the name and address of the laboratory where the work was done.

Papers should be in English, using the spelling of the *Shorter Oxford English Dictionary*. They should be typed with double spacing, on one side only of the sheets, and with ample margins for editorial annotations.

Papers should in general 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. With some types of material headings other than (c), (d) and (e) may be preferable.

The use of footnotes should be avoided if possible. Underlining should be used only to indicate italics. Proper nouns, including trade names, should be given a capital initial letter. Wherever possible numerals should be used unless this leads to ambiguity. The typescript should carry the name and address of the person to whom the proofs are to be sent, and give a shortened version of the paper's title, not exceeding 45 letters and spaces, suitable for a running title in the *Journal*.

### TABLES


Tables should be numbered and should carry headings describing their content. They should be comprehensible without reference to the text. They should be typed on separate sheets and their approximate positions in the text indicated. *To minimize the cost of printing, the number and size of tables should be kept to an absolute minimum.*

### 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 half 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; (c) the figures and lettering.

which are intended to appear on the finished block, in the correct positions relative to the drawing underneath. Each paper should have a separate typed sheet listing figure and plate numbers with their legends, and the approximate positions of illustrations should be indicated in the text.

The photographs and diagrams should be about twice the size of the finished block and not larger overall than the sheets on which the paper itself is typed. For a figure measuring 250 mm × 150 mm all lines, axes and curves should be 0.4 mm thick, thus . Graph symbols in order of preference are ○ ●, △ ▲, □ ■, × +, and for a 250 mm × 150 mm graph the circles should be 3 mm in diam. The triangles should be equilateral of 3 mm side, and the squares also of 3 mm side. The crosses should have lines 3 mm long at right angles. Scale marks on the axes should be on the inner side of each axis and should be 3 mm long.

### SHORT COMMUNICATIONS

Short communications or notes of not more than 2500 words or the equivalent space in print and without a summary will also be published.

### REFERENCES

In the text, references should be quoted by whichever of the following ways is appropriate: Arnold & Barnard (1900); Arnold & Barnard (1900a); Arnold & Barnard (1900a, b); (Arnold & Barnard, 1900). Give all the surnames of 3 authors at the first mention, but in subsequent citations and in all cases where there are more than 3 authors give only the first surname (e.g. Brown *et al.*) provided that there is no possible ambiguity.

References should be listed alphabetically at the end of the paper. Titles of journals should be given in full, 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). *Journal of Dairy Research* 18, 158. References to books should include names of authors, year of publication, title, names of editors, 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.

### UNITS, SYMBOLS AND ABBREVIATIONS

SI units must be used, as explained in British Standards Institution publication PD 5686:1972, *The use of SI units*. Until SI units are widely understood, it is permissible to give the equivalent value in other units in parenthesis. Symbols and abbreviations used are those of British Standard 1991: Part 1: 1967. *Letter Symbols, Signs and Abbreviations*.

### DESCRIPTIONS OF SOLUTIONS

Normality and molarity should be indicated thus: N-HCl, 0.1 M-NaH<sub>2</sub>PO<sub>4</sub>. The term '‰' means g/100 g solution. For ml/100 ml solution the term '‰ (v/v)' should be used and for g/100 ml solution the correct abbreviation is '‰ (w/v)'.

### REPRINTS

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

CONTENTS

ORIGINAL ARTICLES

|   |               |
|---|---------------|
| Effect of thiocyanate on mammary gland growth in rats<br>H. PYSKA   | pages 427-431 |
| Mammary blood flow during experimental <i>Escherichia coli</i> endotoxin induced mastitis in goats and cows<br>G. DHONDT, C. BURVENICH and G. PEETERS                       | 433-440       |
| Metabolic pathways of cytoplasmic droplets from freshly secreted goat's milk<br>R. G. VERNON and W. W. CHRISTIE   | 441-445       |
| The composition of whole casein from the milk of Ayrshire cows<br>D. T. DAVIES and A. J. R. LAW   | 447-454       |
| The caseins of buffalo milk<br>F. ADDEO, J.-C. MERCIER and B. RIBADEAU-DUMAS  | 455-468       |
| Fractionation and characterization of the membranes from bovine milk fat globules<br>B. J. KITCHEN  | 469-482       |
| Milk-fat globule membranes: chemical composition and phosphoesterase activities during lactation<br>T. DIAZ-MAURINO and M. NIETO  | 483-493       |
| The oxidation of lipids by components of bovine milk-fat globule membrane<br>J. C. ALLEN and C. HUMPHRIES   | 495-507       |
| A calorimetric study of the thermal denaturation of whey proteins in simulated milk ultrafiltrate<br>M. RÜEGG, U. MOOR and B. BLANC   | 509-520       |
| The acceleration by cationic materials of the coagulation of casein micelles by rennet<br>M. L. GREEN and R. J. MARSHALL  | 521-531       |
| Proteolysis of $\alpha_{s1}$ -casein by chymosin: influence of pH and urea<br>D. M. MULVIHILL and P. F. FOX   | 533-540       |
| Hydrolysis of lactose in milk and whey with minute amounts of lactase<br>A. DAHLQVIST, N.-G. ASP, A. BURVALL and H. RAUSING   | 541-458       |
| Nutritional value of lactose-hydrolysed milk: protein quality after some industrial processes<br>A. BURVALL, N.-G. ASP, A. DAHLQVIST and R. ÖSTE                            | 549-553       |
| The role of various milk fractions and the importance of somatic cells in the formation of germinant(s) for <i>Bacillus cereus</i> when milk is pasteurized<br>F. L. DAVIES | 555-568       |
| Some factors involved in milk lipase activation by agitation<br>H. C. DEETH and C. H. FITZ-GERALD   | 569-583       |
| SHORT COMMUNICATIONS  |               |
| The relationship between herd bulk milk composition and cell count in commercial dairy herds<br>C. B. ASBY, R. P. GARD and J. H. WATKINS                                    | 585-587       |
| The effect of intergroup movement of dairy cows on bulk-milk somatic cell numbers<br>S. J. KAY, K. A. COLLIS, J. C. ANDERSON and A. J. GRANT                                | 589-593       |
| The isolation and bacteriostatic properties of lactoferrin from bovine milk whey<br>B. A. LAW and B. REITER   | 595-599       |
| The determination of short- and long-chain free fatty acids in milk<br>A. M. A. SALIH, M. ANDERSON and B. TUCKLEY   | 601-605       |
| The proteins and salts of some non-bovine milks<br>P. O'CONNOR and P. F. FOX  | 607-609       |
| Rigidity modulus as a factor influencing the syneresis of renneted milk gels<br>J. LELIEVRE   | 611-614       |
| Evaluation of some coated titanium electrodes for measurements of conductivity of milk and milk products<br>J. H. PRENTICE  | 615-619       |
| Chromatography of milk proteins on hydroxyapatite<br>W. J. DONNELLY   | 621-625       |
| Reviews of the progress of Dairy Science: the heat stability of milk<br>P. F. FOX and P. A. MORRISSEY   | 627-646       |