

---

# BJN

## BRITISH JOURNAL OF NUTRITION

---

Volume: 107

---

Number: 7

---

14 April 2012

---

An International Journal  
of Nutritional Science

### Aims and Scope

The *British Journal of Nutrition* is an international, peer-reviewed journal publishing original papers, review articles, short communications and technical notes on human and clinical nutrition, animal nutrition and basic science as applied to nutrition. Correspondence is encouraged in a Nutrition Discussion Forum. The Journal recognizes the multidisciplinary nature of nutritional science and encourages the submission of material from all of the specialities involved in research and clinical practice. The Journal also publishes supplements on topics of particular interest.

The *British Journal of Nutrition* is published twice monthly by Cambridge University Press on behalf of  
The Nutrition Society.

The *British Journal of Nutrition* is available online to subscribers at [journals.cambridge.org/bjn](http://journals.cambridge.org/bjn)  
Tables of contents and abstracts are available free at the same website.

### Editor-in-Chief

P C Calder, *School of Medicine, University of Southampton, Southampton, UK*

### Deputy Editors

F Bellisle, *INRA, University of Paris, Bobigny, France*

G C Burdge, *Institute of Human Nutrition, University of Southampton, Southampton, UK*

J L Firkins, *Department of Animal Science, The Ohio State University, Columbus, OH, USA*

W D Rees, *Embryo Programming Group, Rowett Institute of Nutrition and Health, University of Aberdeen, Aberdeen, UK*

M B Schulze, *Department of Molecular Epidemiology, German Institute of Human Nutrition Potsdam-Rehbruecke, Nuthetal, Germany*

S J Whiting, *College of Pharmacy and Nutrition, University of Saskatchewan, Saskatoon, Sask., Canada*

### Reviews Editors

P Aggett

D J Millward, *Faculty of Health and Medical Sciences, University of Surrey, UK*

### Systematic Reviews Editor

M Makrides, *Women's and Children's Health Research Institute and University of Adelaide, Adelaide, Australia*

### Supplements Editor

J Woodside, *Nutrition and Metabolism Group, Centre for Public Health, Queen's University, Belfast, UK*

### Editorial Board

J J B Anderson, *Chapel Hill, NC, USA*

J H Beattie, *Aberdeen, UK*

G Bell, *Stirling, UK*

M Blaut, *Bergholz-Rehbrücke, Germany*

T Bohn, *Belvaux, Luxembourg*

J T Brenna, *Ithaca, NY, USA*

S Brix Pedersen, *Lyngby, Denmark*

A E Buyken, *Dortmund, Germany*

J Buyse, *Leuven, Belgium*

K D Cashman, *Cork, Ireland*

R S Chapkin, *College Station, TX, USA*

M S Choi, *Daegu, Korea*

A Collins, *Oslo, Norway*

S J Duthie, *Aberdeen, UK*

U Ekelund, *Cambridge, UK*

A Esmailzadeh, *Isfahan, Iran*

B A Fielding, *Oxford, UK*

M Fukushima, *Obihiro City, Japan*

S Garnett, *Sydney, Australia*

B A Griffin, *Surrey, UK*

J C G Halford, *Liverpool, UK*

W Hendriks, *Wageningen, The Netherlands*

L T Ho, *Taipei, Taiwan*

D J Hoffman, *New Brunswick, NJ, USA*

G Janssens, *Merelbeke, Belgium*

E J Johnson, *Boston, MA, USA*

S J Kaushik, *Saint Pée-sur-Nivelle, France*

D S Kelley, *Davis, CA, USA*

C W C Kendall, *Toronto, Ont., Canada*

J P Lallès, *Rennes, France*

A Laviano, *Rome, Italy*

H J Lightowler, *Oxford, UK*

A M López-Sobaler, *Madrid, Spain*

J A Lovegrove, *Reading, UK*

S R Lynch, *Grafton, VA, USA*

R D Mattes, *West Lafayette, IN, USA*

C Mayer, *Aberdeen, UK*

S McCann, *Buffalo, NY, USA*

J P McClung, *Natick, MA, USA*

S McMullen, *Nottingham, UK*

D McMurray, *College Station, TX, USA*

S McNaughton, *Burwood, Australia*

J G Mercer, *Aberdeen, UK*

A M Minihane, *Norwich, UK*

T A Mori, *Perth, Australia*

H Mukhtar, *Madison, WI, USA*

M Murphy, *Reus, Spain*

P Nestel, *Southampton, UK*

U Nöthlings, *Kiel, Germany*

C M Nyachoti, *Winnipeg, MB, Canada*

M C Ocké, *Bilthoven, The Netherlands*

A Palou, *Palma de Mallorca, Spain*

P Palozza, *Rome, Italy*

J H Y Park, *Chuncheon, Korea*

E Perissinotto, *Padova, Italy*

C J Petry, *Cambridge, UK*

S Proctor, *Edmonton, Alta., Canada*

P Ritz, *Angers, France*

S M Robinson, *Southampton, UK*

E Ros, *Barcelona, Spain*

S Salminen, *Turku, Finland*

T Sheehy, *Cork, Ireland*

A J Sinclair, *Geelong, Australia*

A Sjödin, *Copenhagen, Denmark*

K S Swanson, *Urbana, IL, USA*

D Tomé, *Paris, France*

D Topping, *Adelaide, Australia*

F Visioli, *Madrid, Spain*

J H M de Vries, *Wageningen, The Netherlands*

M R Yeomans, *Sussex, UK*

### Publications Staff

C Goodstein (*Publications Manager*), C Jackson (*Deputy Publications Manager*),

L Weeks, C T Hughes, D Owen and L King (*Publications Officers*)

The Nutrition Society has as its objective the advancement of the scientific study of nutrition and its applications to the maintenance of human and animal health.

Application of membership is invited from anyone whose work has contributed to the scientific knowledge of nutrition, whether such work has been in the laboratory, the field or the clinic, and whether experimental, clinical, agricultural or statistical in nature. There is also a student membership scheme with reduced subscriptions.

Particulars of The Nutrition Society and application forms for membership are available from The Nutrition Society, 10 Cambridge Court, 210 Shepherds Bush Road, London W6 7NJ, UK. Tel: +44 (0)20 7602 0228, Fax: +44 (0)20 7602 1756, Email: [office@nutsoc.org.uk](mailto:office@nutsoc.org.uk)

The Nutrition Society Home Page is at <http://www.nutrition-society.org>