Nutrition Research Reviews (2007), **20**, 119–120
doi: 10.1017/S0954422407856964
© The Author 2007

Editorial

Since the last issue of Nutrition Research Reviews (NRR) was published, we have received the impact factor for 2006, which has risen dramatically to 2·486 (from 2·053); its rank order among nutrition and food science journals now being fourteenth. This is an impressive improvement, and credit must go to David Bender for his contribution to the quality and stature of the journal; he will be a hard act to follow! David has overseen the selection of the excellent reviews contained in this issue, and will continue to support the journal as an editor, I'm glad to say.

Looking back to the first reviews that were published in NRR 1988 and 1989, one is struck by the continuing relevance of some topics in nutrition research, several topics being addressed both in those first issues, and in the present one. The sensory attributes of sugars as determinants of intake were considered by Shepherd in his early review[1], while here Gibson[2] reviews the evidence relating dietary intake of sugars with micronutrient inadequacy. Those of us with a sweet tooth will be heartened by the generally weak and inconsistent evidence for micronutrient dilution by sugar in the diet, though suboptimal intakes seem to occur at both very high (>25 % of energy) and very low (<5 % energy) intakes of sugars; the main constraint on micronutrient adequacy being overall energy intake. The author considers the conceptual question of whether the sugar content of the diet should be expressed as a percentage of total energy, which inevitably 'dilutes' the other components of the diet, or be expressed in a more absolute manner (for example, by energy partitioning), and discusses whether total sugars (including those in fruit) or added sugar is the more relevant variable. Results are profoundly affected depending on the approach used, with implications for policy. It is notable that, while early dietary recommendations attempted quite severely to restrict intakes of sugars, more recent incarnations have pulled back from this position, though of course sugars are still acknowledged to cause dental caries.

Food intake in ruminants is another abiding theme; the 1988 review by Kennedy & Murphy[3] examined the interaction of forage type on particle breakdown, passage and digestion in the gut, which in turn affects voluntary feed consumption (the higher the fibre concentration of the feed, the less well it is fermented, and the less the animal will eat, impacting on its condition). This question of the control of voluntary food intake in ruminants is here taken up by Forbes[4]. To those of us unfamiliar with ruminants, it comes as a surprise that they habitually regulate their food intake rather precisely, both qualitatively and quantitatively, to meet their demands (for reproduction, lactation or growth) and can do this on widely varying types of diet (forage of different species, age and treatment, with or without concentrates) – in contrast with single-stomached creatures such as humans. Ruminants can relate the sensory profile of the food to the subsequent metabolic consequences, which include feedback from receptors in the rumen (for example, for volatile fatty acids), products of nutrient metabolism in the blood (for example, ammonia) and heat generation, and Forbes argues that they learn to consume the diet that minimises the total of the discomforts generated by the several signals from various body systems. He presents an optimisation model, tested in sheep, based on feed metabolisable energy, crude protein and neutral-detergent fibre content, that could perhaps be used in the formulation of feeds and feed regimens for ruminants, and which provides a starting point for further development of models that might include other variables, such as time spent grazing, ease of selection of plants or parts of plants, secondary plant metabolites and toxins, effects of weather, and social interaction. Given the economic importance of ruminants and the plants grown to feed them, it is likely that this review will generate much interest and debate.

High-fibre foods in human diets have traditionally been associated with bowel health, while their beneficial effects in the prevention of CVD have been recognised only since the 1960s. Ryan *et al.*[5] review the bioactivity of oats in this area, exploring the role of the minor phytochemicals rather than that of the soluble fibre content. It seems that the humble oat contains a bewildering array of phytochemicals, including PUFA, oligosaccharides, plant sterols and stanols, and saponins. Water- and fat-soluble antioxidants include vitamin E, tocotrienols, Se, phytic acid, and phenolic compounds, including, uniquely to oats, avenathramides, which have been shown to influence tissue antioxidant enzyme systems such as glutathione peroxidase and superoxide dismutase. They can also inhibit endothelial cell adhesion molecule expression and pro-inflammatory cytokines and chemokines, and may protect LDL from oxidation. However, not all oats are equal – different varieties contain different amounts of the various phytochemicals, as do the different parts of the oat, and processing can lower or raise concentrations to further confuse the picture. In spite of this, the authors are able to endorse the inclusion of oats as part of a balanced diet, though perhaps they should be minimally processed to be of maximal benefit?

The role of antioxidants in heart disease was the subject of one of the first reviews published in NRR, by Duthie *et al.*[6], and they have since become, in the public mind, almost a cure-all. Macular disease is one condition where there is a plausible link with certain dietary antioxidants, the xanthophyll carotenoids; and in the present issue Thurnham[7] critically appraises their dietary importance and relationship with age-related macular disease. The macula contains high concentrations of zeaxanthins and lutein, which confer the characteristic yellow colour to this area of the retina; these pigments must be obtained from the diet,

https://doi.org/10.1017/S0954422407856964 Published online by Cambridge University Press

thus dietary availability impacts upon macular pigment density. Whether this in turn protects against macular disease has not yet been directly demonstrated in humans, but serum lutein and zeaxanthin levels have been statistically related to reduced disease risk. The carotenoids are potent quenchers of singlet oxygen and lipid radicals (generated in the high-light, high-oxygen and high-PUFA environment of the retina), and these particular pigments can absorb damaging blue light (wavelength 400–500 nm), which is implicated in the aetiology of macular disease. Egg yolks are a good, bioavailable source of xanthophylls (which determine the intensity of the yellow colour), concentrations of which can be manipulated by adding xanthophylls, generally in the form of marigold extract, to the chicken feed. It is likely that specific uptake mechanisms allow the eye to concentrate the various xanthophyll carotenoids; men seem to concentrate them better than women, and there is evidence to suggest that uptake may be impaired in smokers – thus women who smoke would seem to be particularly at risk of macular degeneration.

Canine nutrition is not a topic that has featured much in the literature, leading the authors of this issue's paper on the effects of dietary macronutrient composition on canine behaviour[8] to include some fascinating information on creatures as varied as silver foxes, monkeys, and young human offenders, as well as the more usual mice, rats (including rats that kill mice) and pigs. Behaviour has not traditionally been taken into account in the setting of nutritional guidelines for dogs, yet dog delinquency causes sleepless nights, damage and destruction to farm animals, other dogs, or individuals, and, ultimately, the euthanising of millions of dogs each year. Dietary strategies for curbing anti-social dog behaviour would therefore be very useful – there must be a fortune to be made here by someone! Tryptophan (and hence serotonin), tyrosine (and hence catecholamines) and PUFA, especially DHA, are all implicated. A full stomach has a calming effect and, perhaps surprisingly in carnivores, dietary fibre could prove to be a good way of prolonging the satiating effects of a meal in dogs, as well as helping weight control. Maybe the welfare of dogs and their owners could benefit from similar dietary strategies, to complement the daily walk.

Sleep and nutrition don't immediately strike one as obvious bedfellows, but the review by Crispim *et al.*[9] demonstrates that there is a relationship between the amount an individual sleeps and their food intake and metabolism. Counter-intuitively, lack of sleep seems to increase the risk of obesity, and these authors suggest that the current obesity epidemic may be partly caused by our hectic, low-sleep lifestyles. A reduction in the amount of time spent sleeping causes a reduction in levels of leptin and an increase in ghrelin, leading to increased hunger and food intake and a rise in BMI, documented, for example, in shift-workers (who also have a greater preference for higher-energy snacks at night). Intriguingly, leptin and ghrelin themselves appear to be involved in the regulation of sleep. Furthermore, because insulin sensitivity, glucose metabolism, lipolysis and lipogenesis are altered when one is asleep (modulated by various hormones, including growth hormone), chronic sleep loss can eventually lead to metabolic disorders such as insulin resistance, type 2 diabetes and dyslipidaemias (such as raised TAG, especially when food has been eaten at night at which time LPL activity is reduced). Caution is needed before extrapolating these findings to the whole population since most of the work to date has been carried out on young men; clearly more needs to be done with women and other age groups. In the meantime, the term 'beauty sleep' takes on a whole new dimension!

K. M. Younger
Editor-in-Chief
School of Biological Sciences
Dublin Institute of Technology
Kevin Street
Dublin 8
Republic of Ireland
Katherine.Younger@dit.ie

References

1. Shepherd R (1988) Sensory influences on salt, sugar and fat intake. *Nutr Res Rev* **1**, 125–144.
2. Gibson SA (2007) Dietary sugars intake and micronutrient adequacy: a systematic review of the evidence. *Nutr Res Rev* **20**, 121–131.
3. Kennedy PM & Murphy MR (1988) The nutritional implications of differential passage of particles through the ruminant alimentary tract. *Nutr Res Rev* **1**, 189–208.
4. Forbes JM (2007) A personal view of how ruminant animals control their intake and choice of food: minimal total discomfort. *Nutr Res Rev* **20**, 132–146.
5. Ryan D, Kendall M & Robards K (2007) Bioactivity of oats as it relates to cardiovascular disease. *Nutr Res Rev* **20**, 147–162.
6. Duthie GG, Wahle KWJ & James WPT (1989) Oxidants, antioxidants and cardiovascular disease. *Nutr Res Rev* **2**, 51–62.
7. Thurnham DL (2007) Macular zeaxanthins and lutein – a review of dietary sources and bioavailability and some relationships with macular pigment optical density and age-related macular disease. *Nutr Res Rev* **20**, 163–179.
8. Bosch G, Beerda B, Hendriks WH, Van der Poel AFB & Verstegen MWA (2007) Impact of nutrition on canine behaviour: current status and possible mechanisms. *Nutr Res Rev* **20**, 180–194.
9. Crispim CA, Zalcman I, Dáttilo M, Padilha HG, Edwards B, Waterhouse J, Tufik S & de Mello MT (2007) The influence of sleep and sleep loss upon food intake and metabolism. *Nutr Res Rev* **20**, 195–212.

https://doi.org/10.1017/S0954422407856964 Published online by Cambridge University Press