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- Jenkins DJ, Kendall CW, Marchie A, *et al.* (2003) The effect of combining plant sterols, soy protein, viscous fibres, and almonds in treating hypercholesterolemia. *Metabolism* **52**, 1478–1483.
- Brandtzaeg P (2003) Role of local immunity and breast-feeding in mucosal homeostasis and defence against infections. In *Nutrition and Immune Function*, pp. 273–320 [PC Calder, CJ Field and HS Gill, editors]. Wallingford, Oxon: CAB International.
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