

Pastoral Implications of the New Genetics

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Smart Foods from the pastoral sector – implications for meat and milk producers

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Abstract. Smart Foods, or foods with functions that confer health benefits, are the future of the food and nutrition sectors. Pastoral products such as milk and meat are easily manipulated to improve the health benefits of these products. Therefore, there is the potential for farmers to add value to their current products. Additionally, the identification of key nutrients for health and the prevention of disease using nutrigenomic and nutritional epigenetic approaches may identify new ways to manipulate milk and meat products. However, consumer perceptions of product efficacy and the marketing of foods with health claims will be drivers behind the uptake of Smart Foods in the future.

Introduction

What are Smart Foods and why do we need them? The Smart Foods industry is built on the assertion that 'health is the future of food' and that this premise will shape the business of food, nutrition and health for many years to come (Mellentin 2006). Additionally, the European Union (Lähteenmäki and Lødøboer 2006), New Zealand (NZ) Food and Beverage Task Force (NZ Food and Beverage Task Force Report 2006) and Food Standards Australia (Food Standards Australia NZ, www.foodstandards.gov.au, verified 9 April 2008) have identified an urgent need for innovative evidence-based gut health foods. According to the British Nutrition Foundation (www.nutrition.org.uk, verified 9 April 2008), Smart Foods are foods that have been, or will be developed via nutrigenomics and associated technologies, which have physiological or health benefits beyond providing energy and nutrients. The British Nutrition Foundation together with the Design and Technology Association (www.designandtech.org) have included foods with novel molecular structures (e.g. modified starch) and functional foods (e.g. probiotic yoghurt, cholesterol-lowering spreads) as Smart Foods.

The Smart Foods market globally generated sales of United States (US) \$29 billion in 2007 in the US alone, followed by Europe and Japan (www.foodandbeverage.com, verified 9 April 2008). In both Japan and Europe, the area of gut health is instrumental in driving the Smart Foods market (Mellentin 2007). Food and beverage is the largest manufacturing export sector in NZ (Investment NZ 2006; NZ Food and Beverage Task Force Report 2006) but needs to expand product diversity and command greater market premiums. Until now, the small but rapidly growing functional health food industry in NZ has successfully leveraged NZ's key export strengths (clean and green image) to generate export revenue (NZ \$193 million; 1.2% of total food exports in 2006; Investment NZ 2006; NZ Food and Beverage Task Force Report 2006). Within this sector, gut health products represent the largest and fastest growing product group.

While the pastoral products sector (meat and milk products) is currently a large earner in both NZ (NZ\$12.3 billion; www.stats.govt.nz, verified 9 April 2008) and Australia (AU\$9.5 billion; www.austrade.gov.au, verified 9 April 2008), this sector is ideally placed to gain additional profits from what will be an increasing market share in the future. So the question for the pastoral sector is – will it keep producing traditional meat and milk as commodity ingredients or will it add value by increasingly processing them into Smart Foods, and/or producing Smart Foods in the animal and on-farm?

The role of the gut in overall health

The human gastrointestinal tract, with a surface area of 400 m², is the largest interface between human beings and their environment (cf. skin: 2 m²; lung: 100 m²) and is the key driver behind food utilisation. The gastrointestinal barrier is a complex cellular structure, made up of four main components (epithelial cell layer, mucus layer, immunological barrier, and microflora), which acts as a 'biological bouncer' to protect the body from the entry of bacteria and antigens. These four barriers of the gut system do not operate in isolation and constantly communicate with each other. These components interact to maintain barrier integrity and this is fundamental to the delicate balance between health and disease. The gut bacteria and host cells are active participants in this communication network and influence gut metabolic processes throughout life. The identity of almost all of these microbes and their mechanism(s) of action remains largely unknown, as does their interactions with food and the host.

When gut barrier integrity is compromised, it can become 'leaky' allowing pathogens and toxins to seep through and affect the rest of the body. A breakdown in gut barrier integrity is typical in people with diseases and infections such as inflammatory bowel diseases (Crohn's disease and ulcerative colitis), irritable bowel syndrome, and some types of food poisoning. Moreover,

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the potential for the new genetics and the underpinning role of benefits of an holistic approach and provision of pastoral care Significant.

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