MILK AND DAIR PROD C S IN H MAN N RI ION
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Milk is a major source of dietary energy, high-quality protein and fat. It can make a significant contribution to meeting the required nutrient intakes of calcium, magnesium, selenium, riboflavin, vitamin B12 and pantothenic acid. Milk from some animal species can also be a source of zinc and vitamins A, C, D and B6. Bioavailability of some nutrients in milk, for example calcium, is high compared with that in other foods in the diet.

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Milk and dairy products can be important in diversifying the diet. They are nutrient dense and provide high quality protein and micronutrients in an easily absorbed form that can benefit both nutritionally vulnerable people and healthy people when consumed in appropriate amounts. It is important to recognise that a combination of food is necessary for a healthy diet and that milk and dairy products are not the only sources of essential nutrients.

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The critical window for adequate child growth and cognitive development is between conception and 24 months of age and hence many recent international nutrition initiatives focus on the first 1000 days. The components of milk that are thought to be particularly important to supporting child growth are protein, minerals and lactose. Milk-based food products have also been used successfully in the treatment of moderate and severe malnutrition in children. Milk fat contributes about half of the energy in whole milk. For this reason, animal milk can play an important role in the diets of infants and young children in populations with a very low fat intake, where the availability of other animal-source foods is limited. Skimmed milk is not recommended as a major food source during the first two years of life because it does not contain essential fatty acids and lacks fat-soluble vitamins.

Why shouldn't infants (<1yr. age) drink cow milk?

Cow milk does not contain sufficient iron and folate to meet requirements, and animal milks are not recommended for infants younger than 12 months. Consumption of fresh, unheated cow milk by infants prior to 12 months of age is associated with faecal blood loss and lower iron status. Following the World Health Organization (WHO) guidelines on breastfeeding, most national policies recommend exclusive breastfeeding up to six months of age.

There are no global recommendations for milk or dairy consumption. Many countries have developed national dietary guidelines that are based on local food availability, cost, nutritional status, consumption patterns and food habits. Because of differences in these factors, recommendations vary widely. Most countries recommend at least one serving of milk daily, with some countries recommending up to three servings per day. Currently, many national and international bodies recommend consumption of lower-fat dairy foods for developed/high income countries to address problems of overweight and obesity. For the dietary guidelines of various countries see http://www.fao.org/ag/humannutrition/nutritioneducation/49741/en/.

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he role of milk and dairy products in human health has been increasingly debated in recent years, both in the scientific literature and in popular science literature. Evidence from observational studies does not support the hypothesis that dairy fat contributes to obesity. However, weight gain results from consuming more calories than one expends and consumers should only consume milk and dairy as part of a healthy, balanced diet

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Although dairy foods contribute to saturated fatty acid content of the diet, other components in milk such as calcium and polyunsaturated fatty acids may reduce risk factors for coronary heart disease (CHD). The majority of review studies conducting meta-analyses of prospective studies conclude that low-fat milk and total dairy product consumption is generally not associated with CVD, and may actually contribute to a reduction of CVD. Results for full-fat dairy and CVD risk are mixed. The evidence regarding ruminant trans fats and CVD risk is inconclusive. There is moderate evidence showing an association between milk and dairy product consumption and lower incidence of Type 2 Diabetes in adults. Some components in milk and dairy products such as calcium, vitamin D (fortified milk) and milk proteins may be protective against cancer. Several studies suggest that milk may offer protection against colorectal cancer and possibly bladder cancer, although limited evidence suggests that high consumption of milk and dairy products is a cause of prostate cancer.

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Raw milk and raw milk products can lead to food-borne illness in humans. Given that these products are not pasteurized/ treated, alternative safety controls are required to ensure that they do not pose a public health risk.

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A range of animal species produce milk that is consumed. The nutrient composition of milk from minor dairy animals i.e. animals other than cows, buffalo, goats and sheep, has to date received little research attention. This is unfortunate as some of the minor animals, such as donkey, reindeer, yak, Bactrian camel, moose, musk ox, llama, alpaca and mithun, are underutilized. In other words, the production of milk from these minor species has the potential to contribute to food security, health and nutrition and income generation.

Milk from dairy species is generally a good source of protein and is either high in or a source of calcium. Sheep, mare and donkey milks can be considered sources of vitamin C. Sheep, goat, buffalo and Bactrian camel milks are high in or a source of riboflavin. Buffalo milk is high in vitamin B6, while buffalo, Bactrian camel and goat milks can be sources of vitamin A. Bactrian camel milk is high in vitamin D. There are large interspecies differences in nutrient composition. The two extremities are cervid (e.g. reindeer and moose) milks (high in protein and fat, low in lactose) and equine milks (low in protein and fat, high in lactose). Milk fatty acid composition also vary with species. While most milks contain large amounts of saturated fatty acids, horse, donkey and Bactrian camel milks have been reported to contain less. Equine milks resemble human milk in their relatively low content of caseins (type of milk protein). The individual proteins also vary, making camel milks and equine milks possibly more suitable for people who are allergic to cow milk.

The rapid rise in aggregate consumption of meat and milk is propelled by increasing numbers of people with rising incomes changing from primarily starch-based diets to diets containing growing

amounts of dairy products and meat. The underlying forces driving this trend – primarily population and income growth and urbanization – are set to continue, and the potential for increased demand remains vast in large parts of the developing world. Consumption of moderate amounts of dairy and other livestock products has important nutritional benefits, but the rapid growth in production and consumption of livestock products also has a number of possible harmful effects:

The expansion of livestock production increases demand for feed, increasing pressures on the land and water resources, in particular, and increases the livestock sector's impact on climate change through greenhouse gas (GHG) emissions.

The increasing number and concentration of animals in more intensive production system increases contact between people and animals, increasing the risk of spreading diseases and the passage of disease agents between animal species and from livestock to humans.

Intensification of livestock production may marginalize smallholders still further, with serious social implications.

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Producing, processing and distributing milk and dairy products, like other foods, affects the planet. Dairy production systems are important and complex sources of GHG emissions, notably of methane (CH4), nitrous oxide (N2O) and carbon dioxide (CO2). Globally, the dairy sector accounts for around four percent of all anthropogenic GHG emissions, of which milk production, processing and transportation account for 2.7 percent. Dairy production systems also contribute to other environmental issues, notably water resource management, through withdrawals, modification of runoff and release of pollutants. Growing and providing food does entail some environmental effects and efforts are ongoing in the dairy sector to reduce the intensity of emissions. Popular interest in these issues is high and is obliging governments and the international community to examine how we can balance our food choices in view of the benefits as well as the risks that they entail – not only for people's health but also for the sustainability of our environment, and the planet at large. This means that both consumers and producers along the food chain will need to work together to make our food safer, healthier and more environmentally sustainable.

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Nutrition is most likely to be affected by dairy production programming via two pathways: increased milk availability from production leading to increased direct consumption; and improved access to higher-quality foods as a result of increased income. Whether diet improves as a result of increases in income depends on the recipient's understanding the need for good nutrition; if they do not, the additional income may be used to buy more of the same foods or foods of lesser quality. Dairy production programmes tend to be more effective than traditional agriculture production interventions if strategies included: targeting inputs to women; the introduction of small livestock; and communication about the nutritional value of milk.

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Governments, development agencies and the private sector all have roles to play. Nutrition-sensitive dairy-industry development is likely to be more effective if it is applied in an environment where there is high-level political commitment and improved nutrition is generally promoted. In developing countries, governments may have a strong role to play by:

Identifying national nutritional challenges, promoting measurement of nutritional status and providing dietary guidelines. If a strong national nutrition strategy exists, this provides a framework onto which to add a dairy programme.

Providing policies, laws and regulations that support nutrition-sensitive dairy-industry development and the provision of safe milk and dairy products.

Investing or promoting investment in basic infrastructure. Roads, electricity and water supplies limit the practical scope of a dairy programme.

Promoting collaboration between the government agencies responsible for livestock industry development and those responsible for human health and social welfare.

Promoting investment from both public and private sectors in sustainable and inclusive dairy-industry development programmes.

The private sector now leads the dairy sector in the developed world and is putting investment into developing countries. It has the potential to make a social contribution by using its considerable advertising ability to campaign for healthy diets and using its market reach and infrastructure to put milk and dairy products that boost nutrition within reach of low-income populations.