

THE DAIRY INDUSTRY

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Summary

Milk and its products are vitally important to the nutrition and health of children and many adults. Its universal importance places it among the most desired of all food products, and milk is also the source of important industrial chemicals. This chapter addresses the current cultural and contemporary factors that are influencing the character of the dairy industry worldwide. Most nations are placing a premium on developing their dairy production capability. In contrast, markets for milk and dairy products have reached a high level of saturation in highly industrialized nations. Increasingly, these nations are competing for a share of the world market. The authors have selected for inclusion many Internet web page addresses to help the reader stay current on information about dairy production, processing and marketing long after the features of the current times have faded into the past.

1. Overview

The dairy industry of the world has been highly regarded for many years. Most nations have idealized the milk of lactating animals, both human and non-human, as fundamental to nutrition for children. Indeed, milk is an extraordinarily complex and nutritious food that includes most of the nutrients known as essential to child health and development. For example the milk sugar, lactose, is known for its effect on brain development. As “mother nature’s food”, milk is valued for many of its components. In the most affluent parts of the world, the supplies of minerals and protein are the most desired components of milk; but in many economically depressed regions of the world, the energy provided by milk fat remains its most valuable component. Because of the universality of milk in the diets of children, milk has been chosen as a carrier for supplemental Vitamins A and D where these are generally deficient in the diets of children. Unfortunately, in some affluent nations, which often have frequent cloud cover

and prolonged indoor habitation, milk is being ignored or mistrusted by parents who are not encouraging milk intake by their children. Consequently, because of the failure to consume adequate Vitamin D, these nations are witnessing a recurrence of rickets in children.

Having made the point of milk's utility to children, there is the issue of milk allergy, most often in the form of lactose intolerance, sometimes attributed to certain genetic origins of people. Generally, such problems are not apparent until later in life when milk consumption has been deleted from the diet for a long time. Thus, lactose intolerance is no longer perceived uniquely as a genetic predisposition, but rather as a result of the interactions among peoples' genetics and their dietary and cultural habits. There are strategies for handling these problems for most people. Currently, in developed countries, there is a consumer advocacy movement calling for labeling of foods with any known allergens. The dairy industry seems to be willing to do this if the policy is established for all foods. In the end, milk is still highly sought by most societies for its food value as a fluid product or as a manufactured product such as cheese. The development of milk sources is generally very high on the agenda of most nations. The affluent countries have the advantage of abundant milk, so they concentrate on the safety and nutritional features of milk, as well as the marketing methods, to assure a continued supply of products which are reasonably priced.

Many species of mammals are managed for their ability to supply milk. While the dairy cow is the principle supplier of milk, the dairy goat is prominent worldwide as a supplier of milk for humans. In tropical regions of the world, milk from buffalo is on the rise because they are adapted to local feed supplies, management and climate conditions. Sometimes, females of other species such as sheep and horses are valued as milk sources because of specific flavor or texture features of cheeses and other products derived.

When refrigeration is not easily arranged in the marketing or home storage of milk, its quality is short-lived. If not consumed quickly after collection, conversion of milk to a fermented or processed product extends the utility of milk in such circumstances. The need for a "cold chain" to maintain dairy product quality and integrity explains why most of the milk produced in the world is consumed locally. International trade of milk and dairy products remains a small fraction (less than 5%) of world milk production.

From this portrayal of milk and its virtues, it is safe to say the dairy industry of the world is enormous and it is critically important to a quality diet for all people of all ages. In particular, the very young and the very old are the people most affected by the need for the calcium and other ingredients of milk.

Figure 1 shows milk production for the world, including both developing and developed countries as defined by the Food and Agricultural Organization (FAO), from 1965 to 1999. During this period of time, milk production supplied per person in the world has declined slightly from 300 to 260 grams of milk (or equivalent dairy products) per day. However, Fig. 1c shows large discrepancies between developed countries (723 grams per person per day) and developing countries (133 grams per person per day).

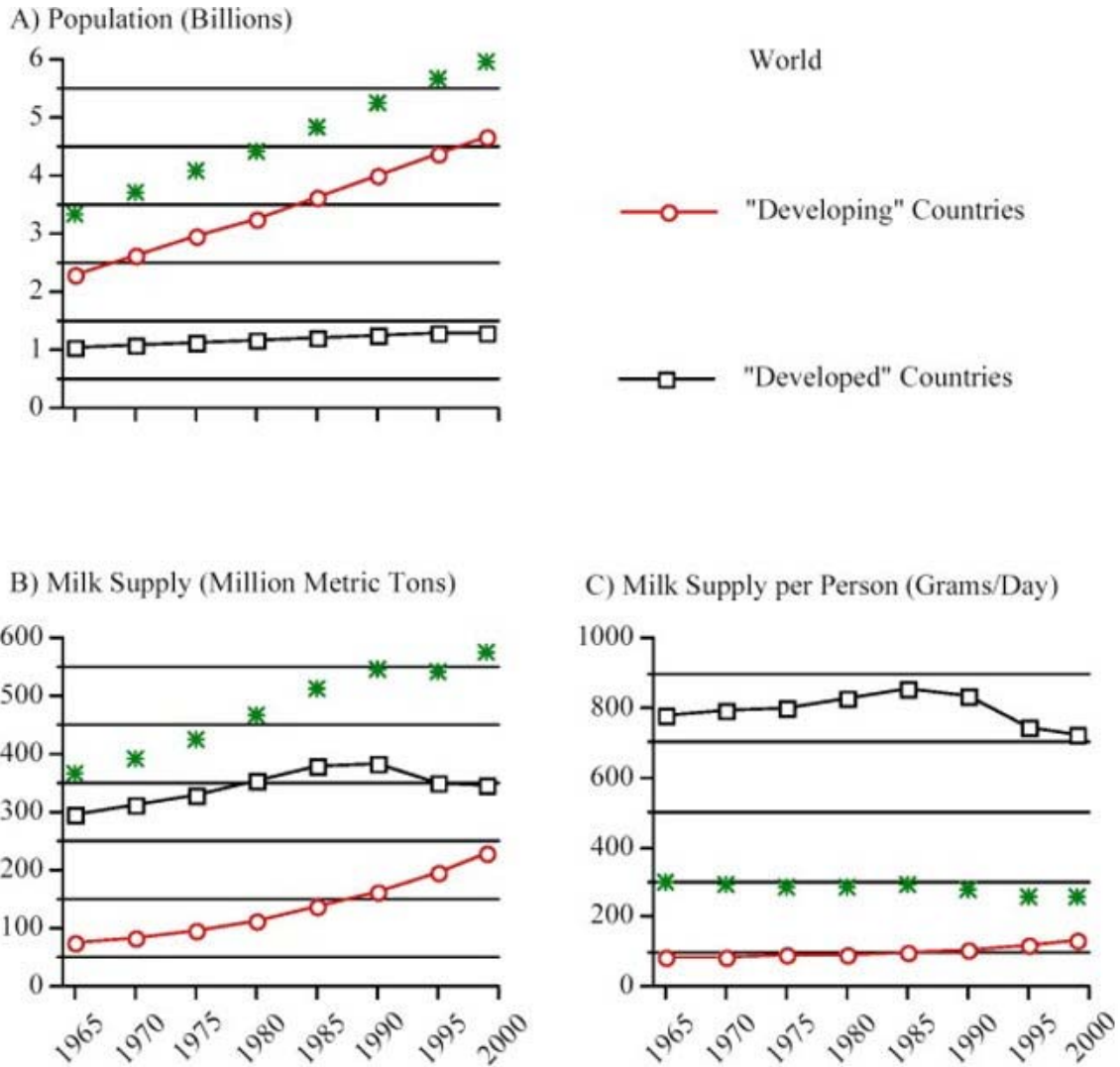


Figure 1. Global milk production from 1965 to 1999.

2. Information Sources

Today's dairy industry ranges from highly complex and electronically controlled milking and management systems to completely manual modes of collection and processing. This treatise will hereafter look mostly at the systems more prominently involved in the world trade of dairy products. The dairy cow is the major source of milk in this regard, but the milking buffalo and Brahman type (*Bos indicus*) cattle are still very prominent in the Asian countries. In tropical zones, their heat tolerance and disease resistance abilities are highly valued even though their inherent milk yield is somewhat lower than for European breeds of *Bos taurus*. Tropical areas of Asia, South America, Africa and Australia are known for their local and Brahman types of cattle for milk production. With the advent of computers, widespread availability of electricity and the even more modern availability of the Internet, it is now possible for most people of the world to obtain better information about the dairy industry than they could ever have previously imagined. In this article, priority is given to materials reported in English, but, some references will be made also to multi-lingual sites. The cost of gaining access

to this information is often handled by institutional sources or advertisers, resulting in minimal cost for the seeker of information, that is, the user. Dairy specialists in government service and consultants can be resourceful in gaining access to the worldwide network of computer-managed information. Technical information, equipment and supplies can be located by the Internet “search engines” that index the names and features of companies, educational facilities, organizations and agencies that have information needed by dairy producers, processors and consumers. Even details of a specific person can often be discovered on the Internet through directories or because the person has a personal web page.

Among the information categories that can be located are research discoveries, equipment items with prices shown and ordering by computer, data on the various aspects of the dairy industry such as milk supplies and availability, regulations controlling the industry and discussion groups that can chat with one another over the computer to find out about mutually interesting problems and solutions. Access to current information is the most powerful tool available to people interested in dairy operations. Here is a brief survey of the information bases of the Internet, which can give assistance in its use. For many readers, this information may seem to be merely a statement of the obvious. But, for many people who have not crossed the “digital divide”, this information may be very useful. This refers to what is known as the WORLD WIDE WEB (www), which is accessible with computer software generally referred to as “web-browsers.” Thus, most addresses in the Internet begin with the source definition of “http://” which sets the stage for the computer browser to converse with the system.

Next, usually but not always, the “www” letters are inserted in the address space of the search engine to tell it where to look for the information sources. The following portion of the address is specific to the identity of the source. If it is not known, a search option is available to seek various sources by using keywords. Last, the character of the source is printed into the address space. There are four categories for this. They are: “.edu” for educational institutions, “.org” for organizations, “.gov” for government agencies and “.com” for commercial sources. With this very brief introduction, a person should seek experienced advice to develop Internet searching skills as rapidly as possible. Knowledge is power and there is a limitless supply of information in the Internet. Educational institutions (.edu) are rich sources of unbiased information that can be very specific to the user’s needs. Also, the faculty directories found in university web pages can lead to the identification of experts who may be contacted. The scientific societies with their peer-reviewed journals are generally in the “.org” category. Among the commercial (.com) companies, now referred to as “dot com” companies in the business jargon, are magazine and newspaper publications, merchandisers, and consulting services by individual companies or industry representatives. The “.gov” grouping includes various levels of government agencies ranging from national to local. Much help can be located through these web pages, such as statistics and frequently updated information on public health, cattle diseases and other national issues.

List-serves are electronic mail (e-mail) discussion groups that use e-mail functions of the Internet to communicate personally with the members of the specific list-serve group. Sometimes, these are known as chat groups. There are many of these and they

can be quite informative as people respond to each other's questions or concerns. Subscribers may include scientists, consultants and students as well as producers. There is a master of the list-serve who monitors the activity of the discussions for observance of common computer courtesies, to enroll those who seek to join and to un-enroll those who wish to leave the list or who are deleted because of misuse of the list-serve. The variety of viewpoints expressed on a list-serve may be puzzling at first, but it provides a unique opportunity for a dialogue despite separation in time and space of people with a common interest. The general rules are that the users' discussions are directed to the nature of the list-serve group, they are respectable and courteous, they are not political, they are not lengthy and they do not use the list-serve for advertising or marketing of personal goods. These list-serves have a common notation ending in "-L". Some examples relative to the dairy industry are:

Dairy-L
Graze-L
Sheep-L

To join such a group, search for its source on the Internet by asking the search option to locate the group. For example, to seek information about Dairy-L, the following web page address would be located: <http://www.wam.umd.edu/~markv/archive.txt> By going to that page, the masters of the list-serve are identified and the means to search through prior discussions on items of interest can be discovered. For Graze-L, the search engine would discover the following web page: <http://grazel.taranaki.ac.nz/welcome.html> .A request for Sheep-L would produce several options. As soon as a group is joined, if that option is chosen and accepted by the web master, messages will begin arriving at the user's computer in large numbers. Consequently, many users prefer to scan the archives rather than join the actual list-serve group. Another Internet site that may be of interest is: <http://Babcock.cals.wisc.edu> . This site provides information on dairy production management with an emphasis on common principles, concepts and practical implications for dairy managers anywhere in the world. The site is multi-lingual with documents in English, French, Spanish, Portuguese, Russian and Chinese. The site also provides a series of publications on the dairy industries in different parts of the world. Dairy processing and manufacturing information is readily tracked at: <http://www.dairynetwork.com/>

Here, information on current topics such as allergen labeling can be read. News on new equipment and competitive products is available. Sources of equipment are linked. From there, it is useful to go to: <http://www.dairypc.org/>. This web page is directed to educational guidelines for the dairy industry. The host, The Dairy Practices Council, is a nonprofit organization of education, industry and regulatory personnel concerned with milk quality, sanitation and regulatory uniformity. For those interested in dairy barn construction, a web page operated by a consortium of university agricultural engineers, known as the Midwest Plan Service, actually makes available free dairy building plans to be downloaded as directed to the user's computer. The address is: http://www.public.iastate.edu/~mwps_dis/mwps_web/d_plans.html

For plastic covered buildings, several companies are available. Search for "solar barns". These are much lower in cost and offer more environmental light than would be found with conventional construction materials.

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TO ACCESS ALL THE 19 PAGES OF THIS CHAPTER,
Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

Biographical Sketches

David. Zartman is a professor in the Department of Animal Sciences at the Ohio State University, where he was formerly Chair of Dairy Science for ten years and Chair of the combined Department of Animal Sciences for another five years. His earlier location was Professor of Animal Science at New Mexico State University.

A National Institutes of Health Special Postdoctoral grant took him to New Zealand for a year in 1973 to study genetics of sheep at Massey University. Later, in 1976, he was awarded a Fulbright Lectureship at the University Pertanian in Malaysia. There, his role was to establish a cytogenetic laboratory in the newly formed animal science program. Other foreign assignments include External Examiner for a Ph.D. program at Ahmadu Bello University in Nigeria, Analyst for the five-year plan for the Animal Science program at Makerere University in Uganda, consultant with Texas A&M University on a model dairy farm in Tatarstan, Russia, and team leader for the Farmer-to-Farmer program to the Kyrgyz Republic in central Asia where an analysis of the dairy industry was done to facilitate AID support for the country.

His career began on a dairy farm in New Mexico as a junior partner. Later, while serving as a faculty member of the New Mexico State University, Zartman managed that farm as a family held corporation for eight years. Zartman has USA and international patents on methods and applications of radiotelemetry of intravaginal temperatures for management decision-making in female mammals. These discoveries are among the results of his life-long research and teaching in the genetics and physiology of various farm animal species.

Michel Wattiaux was originally from a dairy farm in Belgium. He was raised with a strong commitment to making the family farm profitable. After earning a Bachelor's Degree in Agricultural Sciences at the University of Louvain (1982), Michel came to the United States as an International 4-H Youth Exchange (IFYE) student and lived on farms in North Dakota, Louisiana, Colorado, Pennsylvania and Wisconsin. In 1985, he returned to Wisconsin to earn a doctoral degree in Dairy Science (1990). After post-doctoral research in ruminant nutrition, Michel began to work with the Babcock Institute for International Dairy Research and Development at the University of Wisconsin shortly after its inception in 1992. While at the Institute, Michel authored and co-authored four dairy management-related books in a series of Technical Dairy Guides. These books are now available in six languages and have been distributed in more than 80 countries around the world. Michel co-directed the Institute from 1996 until May 2000. His responsibilities have taken him to Asia, Latin America, Africa and The Newly Independent Republics to create educational and scientific opportunities in the growth and development of dairy industries around the world.

Currently, Michel is an Assistant Professor in dairy systems management with the Dairy Science Department at the University of Wisconsin-Madison. His research (30%) focuses on the improvement of dairy farm management in a way that fosters the social, economical and environmental soundness of production systems. His teaching (70%) is to empower students to acquire knowledge, to communicate effectively, and to think creatively so that they reach their potential as life-long learners and innovators.