

CONTEMPORARY DETERMINANTS OF THE FUTURE MEAT INDUSTRY

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Abstract—Meat has been historically an important part of human diet and health, whereas its fat content has been an attribute of growing concern in relation to the nutrition-related diseases in developed countries. While the overall consumption of animal produce has been and is projected to be increasing, meat consumption has shown downward trends. Understanding contemporary determinants of why we eat what we eat, lifestyles within human ecological model, socio-demographical changes and needs, and socio-economical trends may offer opportunities for the future meat industry.

I. INTRODUCTION

Food decision is a leading cause as well as the result of multitude determinants of one's lifestyles; health status; personal preferences, beliefs and attitudes; social values; economic status; environmental and social movements; seasonal and physical accesses and so on (FMI, 1994; Becker et al., 2000; Briefel and Johnson, 2004; Brunso et al., 2005; Chen et al., 2008; Spackman, 2009). Focus of much research in consumers' food decision has been on these determinants that vary among different nations, subpopulation groups or market segments.

Meat acquisition was historically and is still considered a sign of success in human society, and meat sharing still creates personal bonds in most cultures around the world. Meat consumption is a commonly accepted symbol of affluence, well-being, satiety and contentment by the majority (Delgado, 2003; Adhikari et al., 2006; Arnade and Gopinath, 2006; Yach et al., 2006)

Meat consumption has also been a source of moralistic disapproval by others. The view has been strengthened over the years by scientific evidences of its implications in various chronic diseases, particularly in developed countries where most of these studies have been conducted (Bernard et al., 1995; Chao et al., 2005; Glitsch, 2000; Mark, 2003; Leahy, 2010). Furthermore consumers are empowered with dietary recommendations as means to improve public health in the context of diverse populations and lifestyles (US Bureau of the Census, 1984; Dietary Guidelines for Americans, 2005; Food Guide Pyramid, 2005)

Most sectors of food industry including meat industry is heavily influenced by consumers who are subjected to new scientific evidences; new personal, societal, economical, environmental, political and global values and information; application of new technology; and their implementation of the new information at the purchasing and consumption levels (Moore, 2010; Barkema et al., 2001; Grunert et al., 2004; Grunert, 2005, 2006; Hoffmann, 2000; Holm and Mohl, 2000; Wells and Buzby, 2008; Anonymous, 2010; Sloan, 2004; Leahy, 2010; A good example is the observed phenomenon for the past three decade in the U.S., i.e., increasing trend of poultry consumption in opposite to that of meat while the total consumption of animal produce was increasing. The aim of this review is to understand new research efforts and contemporary issues that may possibly serve as determinants to the meat industry in near future.

II. WHY WE EAT WHAT WE EAT IN RELEVANCE TO MEAT INDUSTRY?

Nutrition, foods and health are important agenda but not the most important item at both individual and population levels until the balance is lost and human health reaches crisis either with malnutrition or illnesses (Yach et al., 2006;). Focusing on prevention and public health, several food and nutrition recommendations and guidelines have been in force at the national and global levels (Thiele, et al, 2007; Cash et al, 2006; Jensen and Smed, 2007). The messages in those references are balance, moderation and proportionality and vary among countries (Food Guide Pyramid, 2005).

Food consumption behaviors are best predicted by food available to the nation, food purchased and consumed at the households, and then by individual preferences (Yen et al, 2008; Brunso et al., 2005; Briefel and Johnson, 2004; Spackman, 2009; Mark, 2003). The driving forces for food available for the nation may be global and national economy and agricultural policies, whereas food purchased and consumed by households and consumers may be influenced by menus offered at private and commercial settings, social movements, economy and household and individual lifestyles,

beliefs, health status, food availability, and so on (Erzberger and Kelle, 2003; Grewal and Levy, 2007; Leahy, 2010; Lanbert et al., 2006; Parcell and Schroeder, 2007; Schroeter and Foster, 2004).

Consumers in the U.S. have been reported to prefer to seek moderation rather than transformation and improving their diets rather than changing it. Price, taste and conveniences are facilitator as well as barriers in food decisions (Balch et al, 1997; Bhyuyan et al., 2002). Food items with good prices, taste and convenience may not necessarily be available at convenient times, or require short prepare time for the best texture, flavor and taste.

Meat consumption is a subject of interest in several sets of perspectives- environment, animal and human welfare; social, political, economical, ethical and technical influences on familial and individual decisions; lifestyles and belief system of diverse population groups; gender, or any combinations of these (Moore, 2010; Bernard, 1995; Brunso et al., 2005; Carlsson-Kanyama, 1998). Lifestyles associated with dietary behaviors are however closely related to other lifestyles such as smoking, alcohol intake and physical activities and shopping behaviors.

The positive association between income levels and meat consumption is a well accepted and empirically tested theory, both within and between countries. In the global regions where meat consumption is low, e.g., Asia, Africa and Latin America, dietary translation into more meat is driven by higher disposable income. While the indisputable globalization of tastes, national and regional food preferences around the world and food taboos remain strong among over 2 billion Muslims, Hindus and vegetarians including Seventh Adventists and many other religious groups (Wells, 2008; Regmi, 2006; Anonymous, 2002).

Changing consumer demand for meat reflects changes in lifestyles, preferences, relative prices and available leisure time. Most Americans continue to center meals around meat consumption, as indicated in steady increase since 1970 in per capita consumption of red meat and poultry (FMI, 1994; Leahy, 2010; Lanbert et al., 2006; Schroter and Foster, K, 2004). Most of the increase has been accounted for by poultry replacing beef. The replacement has been hypothesized as consumers' preference structure based on health concerns, increased number of women in workforce that cause switching to foods requiring less time/labor for preparation, and lower relative priced food item (Thiele et al., 2007; Wells and Buzby, 2008).

III. SOCIAL MOVEMENTS THAT IMPACT THE MEAT INDUSTRY

Social movements impact lifestyles including purchasing and consumption behaviors, which in turn change beliefs and attitudes at an individual and societal level. Good examples of recent social movements may include "Buy American", "Green" and "Local" movements. Many social movements influence beliefs, attitudes and eventually behaviors by arousing emotions. Several of the recent social movements that have impacted food consumption may include the following:

The "Locavore" and "Green" movement. The term "Locavore" appeared in 2007 Oxford University Press as the word of the year. The movement has popularized the idea of a local diet, and has been well heralded by the New York Times bestsellers: *The Omnivores Dilemma* of Michael Pollan, and *Animan, Vegetable, Miracle* of Barbara Kingsolver. These books have advocated environmental sustainability. Many locavores argue that a local based diet and local based lifestyles are environmentally more sustainable with low food miles than vegetarian diets. This movement is also to protect local business and against globalization (similar to "Buy American" movement in the U.S.), community gardening, farmers markets, community support agriculture and organic farms. This locavore movement is equally applicable to animal and plant produces.

"Eating locally" has been the biggest food trend for the past three years in the U.S. Consumers today are educated to think holistically about their foods: questioning where it came from, its packaging, and its ecological footprint, healthy menus taste good and helpful for weight control. The trends are consistent with California and Hawaiian cuisine developed for a decade. The recent healthy eating movements started to boom up in other regional cuisines.

Eco-friendly foods have become popular concept and practice on the part of consumers. Consumers want to know about their foods- where it has been grown, what ingredients it contains, how it was packaged, and the footprint. "Supermarket Guru" Phil Lempert, a food trends editor and correspondent for NBC's Today Show, said "It is the evolution of organics that consumers want to know and understand more about the foods they eat. You may choose a locally grown product over one that is organic because the food is fresher and its footprint is smaller."

Local, natural and fresh produces are the reasons why consumers sought after farmers markets, community crops, locally grown foods in restaurant and in mainstream grocery stores. Consumers scrutinize imported foods carefully these days, and looking for those from countries with high safety standards.

Vegetarianism movement. Vegetarianism is a fast growing social movement all in itself and is powerfully coined with choices of lifestyles, the social belief of animal rights movement, and healthful-living movement. The

growing vegetarianism, particularly in developed countries, presents powerful arguments for environmental degradation by meat industry and animal welfare. Though conceptually differ, the growing vegetarianism and the animal right movements share the majority of the same social segments and dietary behaviors.

The just released “Vegetarianism in America” study (2010) published in Vegetarian Times reveals that 3.2% of U.S. adults (7.3 million people) follow a vegetarian-based diet. Of those, 0.5% or 1 million is vegans who consume no diet from animal products. Furthermore about 10% U.S. adults (22.8 million people) consume largely vegetarian-inclined diets. Of those who are non-vegetarians, 5.2% (or 11.9 million people) indicated that they are definitely interested in following a vegetarian-based diet in the future. These data support that potentially about 18% of U.S. population are ready to have meals with no meats.

Socio-demographics of the surveyed vegetarians in the report of 2010 are of interest in projecting future trends: 59% women, 41% men; 42% aged 18-34 yrs, 40.7% 35-54 yrs, 17.4 55 yrs and older; vegetarianism practiced for over 10 yrs (57.1%), 5-10 yrs (18%), 2-5 yrs (10.8%), < 2 yrs (14.1%).

Heritage breed movement. One of new social movements that influence food market and consumption is “heritage foods movement (Moore, 2010). Though the concept of heirloom breeds of livestock dates back for over three centuries, the market for heritage foods is now hot among chefs and restaurants, locavores and farmers market users, nature centers and even animal lovers.

Heritage meats come from cattle, pigs, goats, sheep and other animals that have been around for thousand years, but the numbers have diminished as new breeds are developed and selected for more efficient food production. Heritage movement is a concerted and organized effort to protect many animals that are endangered or close to extinct for the future food supply, sustainability and cultural record. The underlying assumption is that these animals have come from a primitive environment and survived with their genetic strength. Heritage breeds have survived over time because of their ability to adapt to fluctuations in climate, a wider-range of forages plus parasite and disease issues. It believed that survival-of the fittest is at its best. The resiliency is critical to our future supply give the unpredictability of nature. Heritage breeds offer choice and diversity in foods (localharvest.org, heritagefoodsusa.com).

Furthermore, heritage breeds are believed to build biodiversity. Maintaining a variety of animal breeds in the food supply is beneficial and increases the odds with higher resistance to adversary environments, as a uniform population of any animal put us vulnerable and risky situation if endangering environment occurs, as in the Ireland’s potato famine in the 1940’s. However in the U.S., Holstein, Angus and Hereford constitute the majority of dairy stock and beef cattle, respectively

It is believed that heritage meats offer local, regional and specialty views to our food system. Although farm practice depends on individual farmer, often these heritage animals are raised on open pastures for forage. Other supporters of heritage breeders claim that heritage breeds retain essential attributes for survival and self-sufficiency including traits like fertility, foraging ability, longevity, maternal instincts, ability to mate naturally and natural resistance to disease and parasites that are not regulated.

In summary, heritage meats such as wagyu breed in Japan and Hanwoo in Korea gain momentum based on the motivation to save endangered breeds, reduce the risk of food shortages, support local business, improve animal welfare or decrease carbon footprint. Much of the chefs’ interest of heritage meat stems from both the local foods trend and the flavor profile of the meats, because the taste of meat is affected by quality, the age of the animal, the way how it was raised and fed. However there is little information available on the distinguishable nutrient composition of these heritage meats.

Table 1. Common Commercial and Heritage Breeds

COMMON COMMERCIAL AND HERITAGE BREEDS		
Beef	Commercial* Angus, Hereford	Heritage** Devon, Dexter, Galloway, Highland, Red Poll
Chicken	No specific breed name for current commercial chickens; mixture of traits from a variety of breeds.	Barred Plymouth Rock, Dark Cornish, Orpington (eggs)
Dairy	Holstein	Ayrshire, Dutch Belted
Pork	Commercial hybrid of Duroc, Hampshire and Yorkshire breeds	Berkshire, Large Black, Red Wattle, Tamworth
Turkey	Broad Breasted White (“Large White”)	Standard Bronze, Black Spanish, Bourbon Red, Narragansett, Slate, White Holland
<p>* Most prevalent breeds used—but not necessarily the only breeds used for commercial production.</p> <p>** Heritage breed meats and other products are regional in nature. Some may exist in one part of the country and be virtually unknown in another. While these are but a few heritage breeds available, note that whether a breed is considered to be heritage can vary by organization or association.</p>		

IV. SOCIO-DEMOGRAPHICAL CHANGES IN THE WORLD

Around the world, including U.S., the shape of population pyramid changes dramatically. The population pyramid shape projected for 2030 looks slim simply because the baby boomers move up the age ladder. Subsequently the definition of “the aged” has also changed from 51 yrs and older in 1970’s to 60 yrs and older in 1990 and 65 yrs and older in 2000’s (US Bureau of Census, 1984). The changing population pyramid is reflected in the food systems, lifestyles, and health care systems in each nation and around the world. Each cohort in the population pyramid also represents individuals with different lifestyles, dietary behaviors, and health care needs that are distinctive from other age cohorts.

Accordingly national strategy for improving the health, called Health People 2000, 2010 and now 2020, has also shifted. The goals of HP 2010 were increasing quality and years of healthy life, and elimination of health disparities, whereas HP 2020 envisions creating a society in which all people live long and healthy lives.

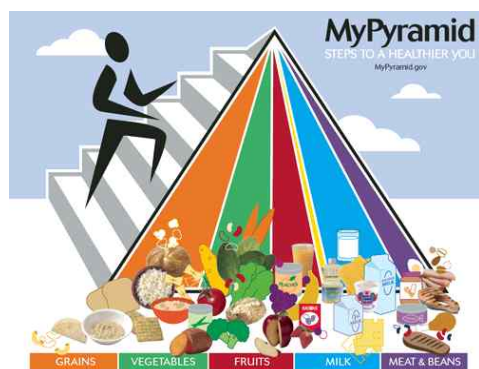
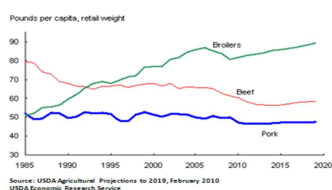
National health Issues are related to dietary behaviors. In the U.S. one in three nonelderly adults are overweight, one in five children at risk of being overweight, obesity linked to an increased incidence of chronic diseases, almost 90% of Americans having diets that need improvement and many illnesses being preventable or mediated through regular physical activity.

Dietary guidance in the U.S. is the practical implementation plan of scientific information at the national level. There are nine key messages in the most recent 2005 Dietary Guidelines in the U.S. This plan is for nutrition-related program providers, health care educators, and consumers to follow. The 2010 version of the Dietary Guidelines is expected to be released soon. The nine major messages are 1) Consume a variety of foods within and month the basic food groups while staying with energy needs. 2) Control calorie intake to manage body weight, 3) Be physically activity everyday, 4) Choose fats wisely for good health limiting the total fat intake to be within 20-35% of total calories recommended for all Americans age 18 yrs or older., 5) Choose carbohydrates wisely for good health, 6) Increase daily intake of fruits and vegetables, whole grains and nonfat or low-fat milk and milk products, 7) Choose and prepare foods with little salt, 8) if you drink alcohol beverages, do so in moderation, 9) Keep food safe to eat. Specific behavioral guidelines under each of these major messages are also outlines in the Dietary Guidelines.

V. CONTEMPORARY FOOD SHOPPING BEHAVIORS THAT IS RELEVANT TO MEAT INDUSTRY

Lifestyles at individual and family levels are well reflected in shopping behaviors. Replacement of red meat with poultry has been mainly explained by the combination of health concerns and other changes such as lifestyles emphasizing timesaving for leisure time, taste preferences, relative price and shorter cooking preparation time. In response, the meat industry in the U.S. has been changing grade standards with leaner meat, smaller packages, and developing time saving products to accommodate U.S. family lifestyles. In the U.S., healthy meal is represented by variety, moderation and balance. As “junk foods” usually refer to fat, sugar, salt and energy-dense foods, minimally processed meat products are considered a part of wholesome healthy meals.

U.S. per capita meat consumption



Meat and Beans



Of the several shopping determinants, the following are considered contemporary issues of concern:

Food safety. No one wants to repeat the scares we had in 2007 in America, when tainted pet food, peanut butter, ground beef, and other products made headlines. American Dietetic Association spokeswoman, Jeannie Moloo, PhD, RD says, "Consumers are demanding safe food for us and our pets, and want the government to update the food safety system so we can have confidence that our food supply is safe."

Prices. Food prices are expected to continue rising, which experts say will cause consumers to rethink their purchasing patterns by pushing consumers out of the fresh produce section into the freezer or canned food aisles. The situation has been exacerbated since the hard economy recession in 2009.

Emphasis on lowering salt. In response to the Dietary Guidelines for Americans and professional organizations, food manufacturers and restaurants have been working to keep the same flavor profile while lower the sodium. Meat industry needs to seek after consumer's attention to the attributes of lean meat that differ vastly from the "junk foods" in all aspects.

Shortcut lifestyles are apparent with so many emerging new terms such as designer food, nutraceuticals, medical foods, magic bullet, and misinformation/disinformation surrounding food and lifestyles that promote health. In contrast, lean meat has the wholesome image if a part of healthy and balanced meal.

Calorie-reduction pledge made in 2010 by sixteen food and beverage companies clearly demonstrate food trends. Many mega companies including Kraft Foods, Hershey, Coca-Cola Co. and PepsiCo, vowed they would cut 1.5 trillion calories from their products by 2015. The group, which is part of the Healthy Weight Commitment Foundation, said it would introduce more low-calorie products; reduce portion sizes; and change recipes of existing foods and drinks. The campaign "is providing a new level of leadership and momentum on childhood obesity," said Kellogg Chief Executive Officer David Mackay, chairman of the foundation. "We embrace this responsibility and we promise to continually improve," said GMA President and CEO Pamela G. Bailey (Wall Street Journal, 5/17/10). Comparing lean meat as a part of healthy and convenient meal with modest and low energy-density will be an important nutrition education for the consumers.

VI. EATING OUT, A SERIOUS LIFESTYLE AND FOOD TREND SETTER

Hot in Chefs Survey. According to the What's Hot Chefs Survey from National Restaurant Association in 2009, locally grown produce was ranked first followed by organic produce and sustainable seafood. These food trends indicate that the importance of locally grown and organic produce become crucial part in people's food life for their desire for healthy eating. All food operations including restaurants, food manufacturers and farmers are increasingly requested to develop ways to provide healthier foods and healthier ecosystem.

On average Americans spend half of their food dollars on meals and snacks away from home- restaurants, school, at work, hotels, etc. In 2001, food away from home exceeded \$400 billion. Consumers who eat healthy tend to be selective of restaurant types; however, nutrition knowledge has little impact on consumer's decisions on choosing foods outside the home (Bhuyyen et al., 2002).

Eating out is an indicator of lifestyles as well as the trends of food life in the society. Customers' beliefs and attitudes are often reflected in their choice of menu selection, which is in turn well understood and reflected by the restaurant chefs. Consequently chefs' collective opinions are important as they reflect national trends, consumers' demand and expectations, and trends (Leach, 2010).

The National Restaurant Association (NRA) which was founded in 1919 conducts an internet survey of professional chefs who are members of the American Culinary Federation (ACF) in fall each year. The NRA is the leading business association for the restaurant industry which is comprised of about one million restaurant and food service outlets and a work force of 13 million workers. The American Culinary Federation, which was established in 1929, is the professional organization for culinary professionals in North America with more than 22,000 members. The chefs are given a list of food items, beverage items, culinary themes and preparation methods, and are asked to rate items as a "hot trends" on restaurant menus in the following year. The hot trends of both 2009 and 2010 indicates top perennial items that are associated with meat dishes, i.e., Locally grown produces; Locally sourced meats and seafood; and Nutritionally balanced children's dishes.



Fig 1. Chef Survey, What's Hot in 2010

VII. SUMMARY

In conclusion, food and nutrition are integrative disciplines within economy, agriculture, religion, social science, biological science, medicine, and public health, psychology at the personal, familiar, national and global levels. Food consumption behaviors and decisions may impact our lifestyles, as much as the choice of lifestyles on our food decisions. Because of the complexity of the interaction among these diverse disciplines, research and program delivery have been challenged. However human nutrition is an integral part of health and wellbeing that have to be addressed through new avenues of these multiple disciplines.

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