DIET/NUTRITION/HEALTH: MEAT AS A FOOD (2000)

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INTRODUCTION: Each year, since 1973, the Food Marketing Institute (an Association representing 1,500 food retailers/wholesalers and the 21,000 retail food stores they operate--these stores have a combined annual sales volume of $220 billion--more than half of all U.S. grocery sales) conducts a nationwide consumer survey to identify changing needs and priorities of supermarket shoppers. Results of the most recent survey, for 1999, were published in "TRENDS IN THE UNITED STATES--Consumer Attitudes and The Supermarket 1999" (Food Marketing Institute, 1999).

FOOD SELECTION CONCERNS: Smith and Morgan (1999) reported that "Six questions asked by consumers as they make decisions about purchasing meat," according to Steve Harper (HEB Supermarkets), are: (1) Will It Hurt Me? (food safety): (2) Is It Good For Me? (diet/nutrition/health); (3) Can I Afford It? (value); (4) Do I Know How To Fix It? (cooking/preparation); (5) Do I Have Time To Fix It? (convenience); and (6) Do I Like It? (preference). According to TRENDS—1988, TRENDS—1992, TRENDS—1996, TRENDS—1998, and TRENDS—1999, the following percentages of the shopping public (Table 1) considered these factors "Very Important" in food selection (Food Marketing Institute, 1988, 1992, 1996, 1998, 1999):

Table 1. Factors "Very Important" In Food Selection.

	1988	1992	1996	1998	1999
TASTE	88%	89%	88%	89%	92%
NUTRITION	72%	77%	78%	76%	70%
PRODUCT SAFETY	83%	71%	75%	75%	70%
PRICE	65%	75%	66%	64%	63%
STORABILITY	53%	46%	43%	45%	42%
EASE OF PREPARATION	39%	36%	36%	37%	35%
FOOD PREPARATION TIME	ND	41%	38%	36%	35%
RECYCLABLE PACKAGING	ND	45%	34%	31%	29%

"Taste" has ranked first in all 12 years of TRENDS analyses while "Nutrition," "Product Safety" and "Price" have always been 2nd to 4th but not always in the order they are ranked in 1999. "Price" tends to rise or fall depending upon the U.S. economic state at the time (year) supermarket shoppers are interviewed; "Nutrition" and "Product Safety" change in relative rank depending upon media coverage of those issues at or near the time of the interviews.

According to Market Link 1998 Shopper Survey (Food Processing, 1999a) the rank (10-point scale) of Influences On Purchases Of Food Products In The Supermarket" were: (1) Taste, 9.61; (2) What My Family Wants/Prefers, 8.64; (3) Price, 8.17; (4) Nutrition, 8.06; (5) Product Convenience, 7.29; (6) Package Size/Portion I Need, 7.01; (7) Information On Package, 6.92; (8) Coupon, 6.52; (9) Brand Name, 6.29; and (10) Easy-To-Use Package, 6.23.

Sloan (2000) said, with 98 million adults afflicted with high cholesterol, 70 million at risk from blood plaque/triglycerides, 50 million with high blood pressure, and 114 million overweight, consumers are looking for wellness and health maintenance when they shop for food. In 1998, for example, 23.68 million households tried to manage heart-related conditions, while 33.69 million were trying to treat them through grocery purchases. In 1999, 55 million (57%) primary grocery shoppers were highly/moderately involved in maintaining their own health, and 52% said health concerns greatly affected their food purchases (Sloan, 2000).

SHOPPERS' EATING HABITS: When asked "How often do you (CHARACTERISTIC)—pretty much every time you eat, fairly often, occasionally or never?" supermarket shoppers responded (Table 2; TRENDS—1997; TRENDS—1998; TRENDS—1999) "pretty much every time" plus "fairly often" (combined) as follows (Food Marketing Institute, 1997, 1998, 1999):

Table 2. How Often Consumers Do Certain Things Relative To Eating Habits.

CHARACTERISTIC	1997	1998	1999
Eat meals at home that are not prepared at home, like takeout or home delivery	15%	15%	15%
Eat home-cooked meals at home	87%	88%	88%
Serve meals using leftovers	43%	41%	41%
Dine out at full-service restaurants	24%	25%	25%
Eat out at fast-food establishments	20%	20%	20%

Why does beef need to be easy, simple, quick and consistent? Smith and Morgan (1999) say it is because: (a) Further-processed chicken has grown from 7% of sales in 1975 to 43% of sales in 1998. (b) 70% of women are in the U.S. work force. (c) 28% of women and 58% of men say they "have no time" or "are too busy" to cook. (d) Two-thirds of all dinner decisions are made on the same day; of those, 73% of dinner preparers don't know at 4:30 p.m. what they're going to

have for dinner. (e) 46% of consumers under age 36 say "lack of cooking knowledge" keeps them from buying certain cuts of beef. (f) Time spent preparing a weekday meal is less than 30 minutes in 40% of households and less than 45 minutes in 78% of households (Smith and Morgan, 1999).

SOURCES OF TAKEOUT FOODS: Based on responses to the question "When meals are eaten at home but not prepared at home, are they purchased most often from a fast-food restaurant, a restaurant, a supermarket, convenience store, gourmet or specialty store or some other place?" from TRENDS—1988, TRENDS—1994 and TRENDS—1999 (Table 3), sources of takeout foods were as follows (Food Marketing Institute, 1988, 1994, 1999):

Table 3. Where Consumers Purchase Meals Eaten, But Not Prepared, At Home.

	1988	1994	1999
Fast-food restaurant	41%	46%	31%
Restaurant	38%	25%	21%
Supermarket	11%	15%	20%
Deli/pizza parlor/shop	ND	ND	11%
Gourmet or specialty store	ND	ND	5%
Convenience store	ND	2%	1%

Responses, in Table 3, were: (a) Fast-food restaurant, 31%; (b) Restaurant, 21% (close to half the number—38%—in 1988); (c) Supermarket, 20% (almost double the 11% in 1988). When asked "How often do you buy the following items from your primary supermarket?", Frozen Main Dishes; Pre-Cut/Marinated/Ready-To-Cook Meat And Poultry; and Pre-Cooked Meat And Poultry, respectively, were eaten: (a) Once a week, by 12%, 10% and 10%; (b) 1-3 times a month, by 28%, 23% and 24%; (c) Less than once a month, by 21%, 18% and 21%; and (d) Never, by 39%, 48% and 43%, of respondents (Food Marketing Institute, 1999).

Healthful fast-food options exist (Waldsmith, 1999). Eating at home isn't always an option which is why fast food is so popular; while it is not easy to integrate fast food with healthful eating, some choices at fast-food restaurants are better than others. Waldsmith (1999) quotes a registered dietitian at Henry Ford Heart and Vascular Institute (Detroit, MI) as saying "The best choice is the plain hamburger; it's lower in fat. The amount of cheese on the cheeseburger is small but it's loaded with fat."

The majority of U.S. women (51%) between the ages of 25 and 39 still make almost every evening meal at home from scratch, according to a survey conducted by the Canned Food Alliance (1999) and reported in Prepared Foods (1999c). "Despite all that we have heard about Americans cooking less and eating out more frequently" says cookbook author and *Bon Appetit* columnist Melanie Barnard, "we still place a high premium on the importance of preparing family meals and eating together every night." On average, all respondents eat dinner at home nearly six nights per week, 91% have children living at home and 71% work outside the home at least part time. The majority describe themselves as "Suzy Homemakers" and 41% categorize themselves as "Prepared Foods Paulas," relying on prepared foods and leftovers to accommodate their

family's busy schedules. More than 4 out of 5 (84%) also use takeout food as a fall-back on really busy nights, with pizza being the overwhelming takeout food of choice (Prepared Foods, 1999c).

According to "TRENDS in the United States—Consumer Attitudes and The Supermarket 1999" by the Food Marketing Institute (1999), the number of times per week consumers eat the main meal away from home is: (a) One time, 33%; (b) Less than once per week, 21%; (c) Two times, 19%; (d) Three or more times per week, 18%; and (e) Never, 9%. Supermarket meal solutions shoppers use most are: (1) Pre-cut and cleaned ready-to-cook vegetable items, 67%; (2) Pre-cut, cleaned and bagged salads, 50%; (3) Frozen side dishes, 44%; (4) Frozen main dishes, 40%; (5) Frozen complete dinners, 35%; (6) Pre-cooked meat, poultry or other main dishes (chilled or hot), 34%; (7) Pre-cut, marinated or pre-seasoned meat or poultry that is ready to cook, 33%; and (8) Prepared ready-to-eat side dishes, 30% (percentages are consumers who buy these, at a supermarket, at least once per month).

IMPORTANCE OF NUTRITION IN FOOD SELECTION: When asked "How important is nutrition when you shop for food?" (asked for the first time in 1999), the following percentages of the shopping public responded (Food Marketing Institute, 1999) as follows: (a) Very Important, 70%; (b) Somewhat Important, 25%; (c) Not Too Important, 4%; and (d) Not At All Important, 1%. The Market Link 1998 Shopper Survey (Food Processing, 1999a) ranked (10-point scale) of "Nutrition Influences On Purchases Of Food Products At The Supermarket" were: (a) Fat/Oil Content, 7.96; (b) Fresh vs. Processed, 7.61; (c) Calorie Content, 7.05; (d) Cholesterol Content, 7.01; (e) Sugar Content, 6.62; (f) Additives and Preservatives, 6.61; (g) How Many Vitamins/Minerals, 6.51; (h) Salt/Sodium Content, 6.39; (i) Does It Use MSG, 5.93; (j) Fiber Content, 5.84.

HEALTHFULNESS OF THE DIET: In response to the question "Thinking of all the foods you eat at home or away from home, how would you describe your diet? Would you say that it 'could be a lot healthier,' 'could be somewhat healthier,' 'is healthy enough,' or 'is as healthy as could possibly be'?" the shopping public (Table 4; TRENDS—1992; TRENDS—1998; TRENDS—1999) said (Food Marketing Institute, 1992, 1998, 1999):

Table 4. Consumer Descriptions Of Their Diets.

	1992	1998	1999
Could be a lot healthier	17%	17%	18%
Could be somewhat healthier	50%	53%	50%
Is healthy enough	23%	21%	23%
Is as healthy as it could possibly be	11%	9%	8%

Chon (1997) reported that only 1% of American young people of ages 2 to 19 years eat healthy diets; on average, young people in that age group receive 40% of their energy from fat and added sugar rather than eating well-rounded diets of a variety of foods. Citing the September 1997 issue of the journal *Pediatrics*,

Chon (1997) reported that 16% of the young people surveyed did not meet any of the federal guidelines on nutrition, with only 30% meeting the dietary recommendations for fruit, grain, meat and dairy foods while 36% ate the recommended amount of vegetables.

ACTIONS CONSUMERS HAVE TAKEN DUE TO NUTRITION CONCERNS: The consumer, says Hollingsworth (1997), is at the hub of the whole process of developing foods considered healthy and/or of containing ingredients considered to be nutraceutical (i.e., containing "bioactive ingredients"—like lycopene, a carotenoid in tomatoes that may help prevent prostate cancer). Today's healthy foods—generally defined as low or no fat, reduced or no salt and/or sugar, no preservatives, and lower or no caffeine—remain strong sellers, if they taste good, but some studies indicate a waning consumer concern with diet and health (Hollingsworth, 1997). Experts believe that concerns about cholesterol-content of foods, calories in foods (and in the diet) and vitamin/mineral-content of foods are declining (Hollingsworth, 1997). Harry Balzer (The NPD Group, Inc.) says "The drop in consumer concern about diet/health/nutrition may be due in part to the success of healthy foods; our 1996 "Eating Patterns In America" study shows a clear drop in nutrition concerns—across the board—with the percentage of consumers agreeing with the statement 'A person should be very cautious in serving food with fat' at a seven-year low. This may be due, in part, to an increase in overall confidence about the availability of healthy products" (Hollingsworth, 1997).

Harry Balzer (The NPD Group, Inc.) discussed results of the latest National Eating Trends report and CREST study in Stillwater, OK in June 1999 (Balzer, 1999) and reported that: (a) Diet/health/nutrition concerns are declining from "high-water marks" in 1991-1993; consumers are less concerned in 1998 than they were in 1988 about salt, fat, preservatives, cholesterol, sugar and caffeine. (b) The major result of the diet/health/nutrition craze of the last two decades is that our animals got skinnier (because of emphasis on leanness in cattle, swine and sheep) while our people got heavier and fatter. (c) Health trends have not disappeared, they've moved to diet/health/nutrition solutions via vitamins and nutraceuticals (Knox Gelatin is now sold as Knox Nutra Joint). (d) We are frying foods less often but eating more fried foods. (e) Side dishes for main meals are disappearing (2.9 per meal in 1987; 2.5 per meal in 1998). (f) Vegetarianism is not increasing much; 3% in 1987, 4% in 1998, do not eat meat. (g) Of meals prepared in the home vs. outside the home, the amount is 50:50 but the cost is 30:70. (h) In the 1970s, 80% or more of women prepared at least one meal per day in the home, in the 1980s it averaged 74% and in 1998 it is 68%. (i) Of 1,095 opportunities to eat a meal in the year of 1998, 682 (62%) were prepared and consumed in the home; 44.7% of those, in 1985, were main meals prepared from scratch while, in 1998, 38.4% were main meals prepared from scratch (Balzer, 1999).

When asked "Have you personally already done any of the following?" the percentages of shoppers who said "Yes" (Table 5; TRENDS—1996, TRENDS—1997; TRENDS—1998; TRENDS-1999) were (Food Marketing Institute, 1996, 1997, 1998, 1999):

Table 5. Things Consumers Have Personally Done Regarding Food Purchases.

	1996	1997	1998	1999
Sought out and purchased "Low Fat" products	81%	82%	83%	77%
Sought out and purchased "Low Cholesterol" products	70%	64%	65%	60%
Sought out and purchased "Natural" products	63%	59%	63%	55%
Sought out and purchased "Low Salt" products	61%	57%	56%	53%
Sought out and purchased "Organic" products	40%	37%	35%	33%
Changed purchases because of product nutrition label	ND	ND	ND	59%
Changed behavior because of safe handling label on meat	43	45	44	42%
Changed purchases because of medically restricted diet	33%	35%	33%	32%
Changed purchases because of food guide pyramid	23%	27%	27%	25%
Changed purchases because of five-a-day campaign	22%	23%	21%	23%
Changed purchases because of vegetarian/non-meat eater	14%	18%	18%	17%

According to TRENDS—1999: (a) Fat continues to be the top nutrition concern to consumers. (b) Over 70% of consumers claim they are eating more produce in an effort to maintain a healthier diet. (c) More than half of shoppers hold themselves responsible for the nutrition of the food that they buy. Although 92% of shoppers express at least some concern about nutrition, and are most worried about fat, salt and cholesterol, consumers do not always act on their concerns (TRENDS—1999). While 50% of consumers cite fat as a concern, only 28% say they are eating less fats/oils. But, 77% said they sought out and purchased low-fat products; so, consumers are taking the "easy way out," addressing their concern with fat by buying lower-fat versions of foods they love (Food Marketing Institute, 1999).

Based on a survey of 2,000 consumers, the 1997 HealthFocus Trend Report found that certain demographic groups—such as older shoppers—are more likely to maintain a low-fat diet; in addition to buying low-fat foods, this could mean eschewing red meat and making recipe substitutions (Littman, 1998). Who buys low-fat foods? Percentages of consumers who say they always/usually maintain a low-fat diet were: Elders, 62%; $50,000-plus Incomes, 54%; Swing Generation, 52%; College, 51%; Women, 50%; Generation X, 45%; Baby Boomers, 45%, and; Single 44% (Littman, 1998).

Because 77%, 55% and 33% of supermarket shoppers (Table 5; Food Marketing Institute, 1999) say they "seek out and purchase" products "low in fat," "natural" and "organic," respectively, there is need to made such beef available in supermarkets. Beef steaks and roasts that are low in fat (and calories and cholesterol) can be produced quite easily from very lean cattle, the trick is to do this while also making the beef satisfactorily palatable. "Natural" and/or "Organic" beef steaks and roasts must come from source-verified, production practice-verified or USDA process-verified programs (Smith and Morgan, 1999). Maverick Ranch Beef (Denver, CO) has successfully merchandised "Natural Lite Beef" to satisfy needs of consumers who desire "low fat" and "natural" beef steaks, roasts and ground product (Smith and Morgan, 1999).

"Vitamin Cottage Natural Food Markets in Colorado sell the following antibiotic-free and hormone-free brands of meat products" says Tracy Scheig R.D. (an employee of that firm),

"Lasater Beef, Rocky Chickens, Haugen Lamb and Applegate Farms Meat Products" (Vitamin Cottage Health Hotline, 1999b). Unfortunately, those who say that meat or poultry is "hormone free" are misinformed. Animals (including humans) could not live if they did not produce hormones; as a result, all meat products have residues of endogenously generated hormones.

New Product News (1999) identified as themes in new product introduction in North America in 1998: (a) Low-calorie and low-fat products continued their downward slide. (b) Introductions with added "healthy" components, such as calcium and fiber, increased. (c) "Organic" and "All-Natural" products posted sizable gains. (d) Convenience is still the key for consumers; meal kits and meal components are leading the charge to satisfy that need. (e) Efficient Consumer Response (ECR) initiatives and corporate restructuring have spurred many companies to focus on developing fewer—but better—new products. For processed meat and poultry products, keys to new-product introductions were "healthy" and "convenient" (New Product News, 1999).

Prepared Foods (1999a) reported that: (a) Organic food and beverage sales are growing 20 to 30% annually and will top $6 billion in 2000. (b) Consumers are flocking to natural and organic foods because of concerns about pesticides, fear of genetically modified plants, environmentalism, and perceptions that they are more healthy and wholesome. (c) "Low" wasn't the hot prefix last year in new product introduction; "natural" set the pace and "organic" was next (with more than 800 introductions in 1998. (d) Top 15 Food Trends for 1999-2000, according to New Product News magazine, included as the Number 1 Trend, "Consumer preferences will shift from low-fat and nonfat foods to "organic" and "all-natural." (e) Sales of organic beef, pork and poultry could reach $670 million within the next 3 years.

Prepared Foods (1999a) characterized changes from 1996 through 1998 in food products bearing nutritional claims as follows: (a) Largest decreases in new-product offerings were for "reduced/low fat," "reduced/low salt" and "reduced/low sugar" products; (b) Intermediate decreases in new-product offerings were for "low/no cholesterol" and "reduced/low calorie" products; and (c) Increased new-product offerings categories were "all-natural," "added/high fiber," "added/high calcium" and "organic" products.

Each year from 1990 to 1997, the retail market for "natural" foods grew 15 to 25%, according to a 1999 study by the Henry A. Wallace Institute for Alternative Agriculture (Food Processing, 1999b). In 1997, natural foods posted retail sales totaling $5.5 billion; if current trends continue, retail sales for "natural" foods will exceed $60 million by 2008 (Food Processing, 1999b).

The "Top 15 Food Trends For 1999-2000," called "15 Ballpark Bets" by Prepared Foods (1999b) are: (1) The Natural (organic and all-natural foods); (2) Enroute To Ensemble (nutritionally enhanced/functional foods); (3) Packaging For Seniors (bottles and bags that actually open); (4) Voluptuous Sells (focus on taste, irrespective of fat content); (5) Rip HMRs (no one wants a HMR; they want convenient products); (6) Function Conjunction (functional foods, not beverages); (7) Three Little Pigs (bacon is in; in chips, dips, salad dressings, side dishes); (8) Betty Crocker Branches Out (into casseroles, pastas and cup dishes); (9) Hispanic Happenings (more products with spicier ethnic flare); (10) Vanilla: Flavor Of The Year (wide range of upscale, elegant, sought-after flavor); (11) Brazilian: Cuisine Of The Year (beef products with

chimmichurri sauce); (12) www.watchout.com (Internet as a legitimate contender for consumer food dollars); (13) One Big Mart (Kmart, Wal-Mart will enter traditional supermarket business); (14) The Force Is With Tie-Ins (a bonanza of Star Wars™ products and tie-ins); (15) Y2K XS (excess of products claiming "product of the millenium").

Brasher (2000) reported that USDA would soon release new federal standards for organic foods and that those standards were expected to: (a) Require that farmers go through a mandatory planning process and have their practices certified by an approved state or private agency. (b) Restrict the pesticides, fertilizers and seed treatments they can apply. (c) Limit the kind of additives and packaging processors can use. Banned will be additives such as sulfites, nitrates or nitrites, for example (Brasher, 2000).

EATING MORE/LESS TO MAKE THE DIET HEALTHY: Do U.S. citizens eat too much meat? Apparently not. An article in Virginia Cattlemen (1999) cites results of a USDA-ARS Food Intake Survey in 1998 that are presented in Table 6:

Table 6. Nationwide Measurement Of The Kinds And Amounts Of Food Eaten by U.S. Citizens.

Food Group	Recommended Servings	Average American Diet
Grain	6 to 11 servings	6-2/3 servings
Vegetable	3 to 5 servings	3-1/3 servings
Fruit	2 to 4 servings	1-1/2 servings
Dairy	2 to 3 servings	1-1/2 servings
Meat	5 to 7 ounces	4-3/4 ounces
Fats/Oils/Sweets	Use sparingly	Excessive

SOURCE: USDA-ARS Food Intake Survey (1998).

According to Cattle•Fax (1995) consumers spend 50% of their retail meat dollars for beef, 24% for poultry, 13% for pork and 12% for fish and seafood. And, expenditures for food, as a percentage of disposable income "at home," "away from home" and "in total" were 10.0%, 4.0% and 14.0%, respectively, in 1975, and 6.0%, 5.4% and 11.4%, respectively, in 1994 (Cattle•Fax, 1995). Ledall (2000) said that, according to recent CREST data, in 1999 there were 7.2 billion beef servings in commercial restaurants compared to 5.2 billion poultry servings, 2.0 billion seafood servings and 0.5 billion pork servings.

A study by the Economic Research Service of USDA (Food Technology, 1999) evaluated food consumption, prices and expenditures in 1970 as compared to 1997. They reported that each American, in 1997, consumed, on average and in comparison to 1970: (a) 65 lb more grain products, (b) 57 lb more fruit, (c) 32 lb more caloric sweeteners, (d) 17 lb more cheese, (e) 13 lb more boneless, closely trimmed meat, poultry and fish, (f) 13 lb more added fats and oils, (g) 3 gallons more beer, (h) 70 fewer eggs, (i) 10 gallons less coffee, and (j) 7 gallons less milk. Percentage of disposable personal income spent for food was 13.8% in 1970 vs. 10.7% in 1997 (Food Technology, 1999).

There are consumer-activist groups that attempt to keep the public aware of matters of concern to private/public health and well-being. Center for Science in the Public Interest has a Nutrition Action segment that is, according to the Boston Globe, "The nation's most respected nutrition advocacy group based on science" (Nutrition Action Newsletter, 1999). In July 1999, Nutrition Action reiterated its recurring theme—"You know that by eating less fat, more fiber, less salt and less sugar…you can reduce your risk of heart disease, stroke, colon cancer, obesity and other health problems" and identified "10 Foods You Should Never Eat!" (included were #1, Quaker 100% Natural Oats & Honey Granola, #2 Gwaltney Great Dogs Chicken Franks, #6 Oscar Mayer Lunchables, #7 Burger King French Fries) as well as #10 Super Foods You Should Eat !" (included were #1 Sweet Potatoes, #2 Whole-Grain Bread, #3 Broccoli, #4 Watermelon, #5 Beans, #6 Cantaloupes, #7 Spinach, #8 Oranges, #9 Oatmeal and #10 Fat-Free, or 1%-Fat, Milk). Schmid (1999) reported results of a Center for Science in the Public Interest (CSPI) report that said "The American diet is full of sugar that's been added to the natural sweeteners in foods, and the amount is increasing (from 51 pounds per person in 1984, to 64 pounds per person in 1998) so CSPI has petitioned the Food and Drug Administration to change the current food label requirements to add a line listing 'added sugar' and show what percentage that is of a recommended daily amount."

When asked "What, if anything, are you eating more or less of to ensure your diet is healthy?" the percentage of supermarket shoppers (Table 7; TRENDS--1990; TRENDS--1994; TRENDS--1999) who offered the following unaided responses were (Food Marketing Institute, 1990, 1994, 1999):

Table 7. Things Consumers Eat More Or Less Of, To Make Their Diet Healthy.

	1990	1994	1999
(1) More fruits/vegetables	57%	63%	71%
(2) Less fats/oils	27%	32%	28%
(3) Less meat/red meat	34%	31%	27%
(4) Less snack foods/junk foods	ND	11%	22%
(5) Less sugar	19%	13%	14%
(6) More chicken/turkey/white meat	19%	13%	10%
(7) Less salt/sodium	15%	7%	9%
(8) Less dairy products	ND	ND	7%
(9) Less fried foods	ND	ND	6%
(10) More fish	ND	ND	5%
(11) More low fat/skim milk	ND	ND	5%
(12) More fiber	ND	ND	4%
(13) More whole grains	ND	ND	4%
(14) Less cholesterol	5%	3%	4%

(15) More starch/rice/potato/pasta	ND	7%	4%
(16) More balanced diet/wider variety	3%	5%	3%
(17) Less bread	ND	ND	3%
(18) More fresh food	6%	5%	2%
(19) More juices	ND	2%	2%
(20) More protein	4%	2%	2%
(21) More vitamin/mineral supplements	1%	2%	2%
(22) More water/bottled water	1%	1%	2%
(23) Less soda	ND	ND	2%
(24) More lean meat	ND	ND	1%
(25) More meat	ND	ND	1%
(26) Less eggs	ND	ND	1%

USA TODAY (2000b) reported results of a national survey that identified U.S. consumers' food favorites in the following categories: (a) Fruit, strawberries (39%), (b) Takeout Dinner, pizza (39%), (c) Snack Food, potato chips (26%), (d) Cuisine, Italian (81% at home and 72% dining out), (e) Comfort Food, ice cream and pasta (tied at 26%), (f) Dessert, crème brulee (18%) and (g) Car Food, hamburger (64%).

CONCERN ABOUT NUTRITIONAL-CONTENT OF FOODS: When asked "Would you say you are very concerned, somewhat concerned, not very concerned or not at all concerned about the nutritional content of the food you eat?," the shopping public (Table 8; TRENDS—1986; TRENDS—1992; TRENDS—1999) responded (Food Marketing Institute, 1986, 1992, 1999):

Table 8. Consumer Concern About Food Nutritional Content.

	1986	1992	1999
Very Concerned	58%	64%	49%
Somewhat Concerned	40%	31%	41%
Not Very/Not At All Concerned	2%	5%	10%

Woman's Day (1999) provided a list of the Top Ten Sources Of Calories in American diets. From where do we get our calories (based on a study published in the Journal of the American Dietetic Association)? The list is as follows: (1) Bread, (2) Beef, (3) Milk, (4) Cake/Cookies/Donuts/Quick Breads, (5) Soft Drinks, (6) Poultry, (7) Cheese, (8) Salad Dressing/Mayonnaise, (9) Margarine, and (10) Sugars/Syrups/Jams.

When asked if they believe the following food items constitute a "serious," "somewhat of a," "slight" or "no" health risk, supermarket shoppers responded (Table 9; TRENDS—1988, TRENDS—1993, TRENDS—1997) as follows (Food Marketing Institute, 1988, 1993, 1997):

Table 9. Consumer Opinions Of Health Risk Of Food Items.

	A "serious" health risk		
	1988	1993	1997
Fats	61%	57%	44%
Cholesterol	59%	51%	44%
Salt in food	42%	33%	23%
Sugar in food	28%	16%	16%

From these data, the shopping public was, in 1997 (this question was not asked in TRENDS—1998 or TRENDS—1999), less concerned about the nutritional content of their food and consider fats, cholesterol and salt in their food a less serious health risk than was the case in either 1988 or 1993. At the Reciprocal Meat Conference of the American Meat Science Association in July 1997, Cary Humphries, Jr. of Excel, Inc. said, "In 1997, consumers say to themselves…If I consume food with too much fat, calories and cholesterol, it might kill me…30 or 40 years from now; if I consume food with bad bacteria, it may kill me…in 3 or 4 days!! Consumers are much more concerned about the safety of food than in its nutritional content" (Humphries, Jr., 1997).

Balzer (1999) followed food diaries for a housewife (in 1955), that same woman later in life (in 1997), and that of her daughter, now a housewife (in 1997), for a story in the Washington Post in 1999. The housewife in 1955 prepared 21 of 21 meals in a week in the home, took 29 minutes to prepare the average meal and served coffee as the primary beverage at those meals. Forty-two years later that housewife prepared 11 of 21 meals, took 9 minutes to do it and served primarily soft drinks. But, her daughter prepared 18 of 21 meals in a week in the home, took 20 minutes to prepare the average meal and served coffee as the primary beverage at those meals. The point is that people, individually, change as they proceed to a new lifestage but people of the same lifestage don't differ much in what they do compared to what their parents did at that stage in their life (Balzer, 1999).

SPECIFICS OF NUTRITIONAL-CONTENT CONCERNS: The shopping public (Table 10; TRENDS—1989, TRENDS—1992, TRENDS—1995, TRENDS—1998; TRENDS—1999) answered the question, "What is it about the nutritional content of what you eat that concerns you most?" as follows (Food Marketing Institute, 1989, 1992, 1995, 1998, 1999):

Table 10. Consumer Concerns About Nutritional Content Of Foods.

	1989	1992	1995	1998	1999

1. Fat content	29%	50%	65%	59%	50%
2. Cholesterol levels	38%	30%	18%	20%	18%
3. Food/nutritional value	8%	5%	8%	12%	17%
4. Salt/sodium content	25%	21%	20%	24%	16%
5. Sugar content	15%	13%	15%	12%	9%
6. Calories	15%	9%	13%	11%	8%
7. Chemical additives	7%	9%	10%	6%	8%
8. Preservatives	9%	11%	11%	5%	6%
9. Freshness/purity/no spoilage	6%	5%	7%	4%	3%
10. Desire to be healthy	6%	2%	3%	3%	3%
11. Protein value	4%	2%	2%	1%	2%
12. Vitamin/mineral content	21%	8%	8%	<0.5%	2%
13. Fiber content	5%	2%	2%	2%	1%
14. Carbohydrate	2%	2%	1%	2%	1%
15. Nothing causing illness/cancer	2%	2%	2%	1%	1%
16. Ingredients/contents	4%	5%	6%	1%	1%
17. Getting a balanced diet	10%	4%	2%	1%	1%
18. Less red meat	3%	2%	<0.5%	1%	1%
19. As natural as possible	3%	2%	5%	2%	<0.5%
20. Quality of food	3%	2%	<0.5%	2%	<0.5%
21. Artificial sweeteners	1%	1%	1%	<0.5%	<0.5%
22. Chemicals	3%	4%	4%	<0.5%	<0.5%
23. Excess food coloring/dyes	1%	1%	2%	<0.5%	<0.5%
24. Empty calories/junk food	2%	2%	2%	<0.5%	<0.5%
25. Processed foods	1%	3%	1%	<0.5%	<0.5%

Primary nutritional-content concerns among members of the shopping public (Table 11; TRENDS—1983; TRENDS—1987; TRENDS—1993; TRENDS—1999) have changed in the manner shown below (Food Marketing Institute, 1983, 1987, 1993, 1999):

Table 11. Changes In Consumer Concerns About Nutritional Content Of Foods.

	TRENDS 1983	TRENDS 1987	TRENDS 1993	TRENDS 1999	ANNUAL RANKS			
					1983	1987	1993	1999
Chemical Additives	27%	10%	6%	8%	1	9	9	7
Vitamins/Minerals	24%	21%	10%	2%	2	2	6	12
Preservatives	22%	14%	8%	6%	3	5	8	8
Sugar	21%	16%	18%	9%	4	3	4	5
Salt	18%	22%	26%	16%	5	1	2	4
Fat	9%	16%	54%	50%	11	4	1	1
Cholesterol	5%	14%	23%	18%	14	6	3	2
Calories	6%	14%	15%	8%	12	7	5	6
Nutritional Value	10%	13%	10%	17%	10	8	7	3
Freshness	14%	8%	3%	3%	6	10	13	9

WHY THE "ABOUT-FACE" IN NUTRITIONAL-CONTENT CONCERNS OCCURRED: What transpired between 1983 and 1999 to cause the 11th and 14th greatest nutritional-content concerns in 1983 to become the 1st and 2nd greatest nutritional-content concerns of 1999?

Dietary Guidelines:

(1) Development and dissemination of "dietary guidelines" by numerous government agencies, consumer organizations and health associations.

Media Coverage:

(2) Widespread media coverage of studies, reports and opinions that diet was related to health, well-being and longevity, and

Dietary Intervention Strategies:

(3) Promulgation of "High-Risk" and "Population or Public-Health" dietary intervention strategies by the health/medical community.

EVOLUTION OF DIETARY GUIDELINES: The first set of "dietary guidelines" was very general and was released in 1983 by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. There is a set of "dietary guidelines" that was developed by the American Heart Association (1990) and was given the blessing of the following nine groups:

(1) American Academy of Pediatrics (AAP)
(2) American Cancer Society (ACS)
(3) American Diabetes Association (ADbA)
(4) American Dietetic Association (ADtA)

(5) Centers for Disease Control (CDC)
(6) National Cancer Institute (NCI)
(7) National Heart, Lung and Blood Institute (NHLBI)
(8) U.S. Department of Agriculture and U.S. Department of Health and Human Services (USDA/USHHS)
(9) American Heart Association (AHA)

Eight of those groups (all except group number 8, above) have dietary guidelines that use specific, rather than general, information about what consumers should (or should not) eat (giving advice to all U.S. citizens in this manner is a form of the "Population or Public Health Strategy" of dietary-intervention), for example:

The public should:

(a) reduce total fat consumption to less than 30% of calories (used by ADbA, ADtA, AHA, NCI and NHLBI),
(b) reduce saturated fatty acids to less than 10% of calories (used by ADbA, ADtA, AHA and NHLBI),
(c) reduce cholesterol to less than 300 milligrams per day (used by ADbA, ADtA, AHA and NHLBI),
(d) assure that carbohydrates constitute 50 to 60% (ADbA) or 50% or more (AHA) of calories,
(e) assure fiber intake of 40 grams (ADbA), 20 to 35 grams (ADtA) or 20 to 30 grams (NCI) per day, and
(f) limit salt consumption to 3,000 milligrams per day (AHA).

Nevertheless, all nine of the aforementioned groups agreed on May 29, 1990 to call on U.S. citizens to improve their health status by eating a balanced diet with less total fat and saturated fat and by maintaining a reasonable body weight. Moreover, these nine groups agreed on the general concepts of "The Healthy American Diet" (American Heart Association, 1990), which are as follows:

(a) Eat a nutritionally adequate diet consisting of a variety of foods.
(b) Reduce consumption of fat, especially saturated fat, and cholesterol.
(c) Achieve and maintain a reasonable body weight.
(d) Increase consumption of complex carbohydrates and fiber.
(e) Reduce intake of sodium.
(f) Consume alcohol in moderation, if at all. (Children, adolescents and pregnant women should abstain.)

The latest set of “federal dietary guidelines” were released in 1995 by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services (USDA/USDHHS, 1995). According to USDA/USDHHS (1995), the Dietary Guidelines For Americans are: (1) Balance the food you eat with physical activity—maintain or improve your weight, (2) Choose a diet with plenty of grain products, vegetables and fruits, (3) Choose a diet low in fat, saturated fat and cholesterol, (4) Eat a variety of foods, (5) Choose a diet moderate in salt and sodium, (6) Choose a diet moderate in sugars, and (7) If you drink alcoholic beverages, do so in moderation.

Food Chemical News (2000) reported that the Dietary Guidelines Advisory Committee has proposed the following, as a revision of, "federal dietary guidelines": (1) Aim for a healthy weight, (2) Be physically active each day, (3) Let the Pyramid guide your food choices, (4) Eat a variety of grains daily, especially whole grains, (5) Eat a variety of fruits and vegetables daily, (6) keep food safe to eat, (7) Choose a diet that is low in saturated fat and cholesterol and moderate in total fat, (8) Choose beverages and food that limit your intake of sugars, (9) Choose and prepare foods with less salt, and (10) If you drink alcoholic beverages, do so in moderation. These proposed, revised "federal dietary guidelines" still must be approved by USDHHS (Food Chemical News, 2000).

Hellmich (2000) announced that the American Heart Association is reconsidering its guidelines on how much fat we should eat. Under discussion are: (a) More individualized diet plans for people with specific conditions, such as diabetes. (b) Changes in the types and amounts of fat recommended. (c) More restricted fat intake for some people, such as those with heart disease. Currently, the heart association's recommended diet for healthy Americans suggests getting no more than 30 percent of calories from fat. The guidelines call for less than 10 percent of calories from saturated fat (fatty meats, whole milk); up to 10 percent from polyunsaturated fat (vegetable oils like corn); and up to 15 percent from monounsaturated fat (olive oil). Felicia Busch, a spokeswoman for the American Dietetic Association, said the revamping is overdue: "I'm glad they are looking at the more current research and realizing that one size doesn't fit all when it comes to fat intake" (Hellmich, 2000).

PUBLIC-HEALTH VS. HIGH-RISK DIETARY-INTERVENTION STRATEGIES: The "Healthy American Diet" takes into account total nutritional needs as well as control of risk factors for cancer, diabetes, heart and blood-vessel disease, and stroke (American Heart Association, 1990) and is a part of the "Public-Health Strategy".

The National Cholesterol Education Program (1988), as a part of the functions of the National Heart, Lung and Blood Institute (of the National Institutes of Health), prefers a program designed to test and treat the sick (following the "High-Risk Strategy"). In that NCEP effort, each person is advised to have their blood cholesterol tested; and, if it exceeds 240 milligrams (of cholesterol) per deciliter (of blood), to try first dietary intervention and--if that fails--to consider drug therapy.

According to the National Live Stock and Meat Board (1991), "A recent Gallup Survey (The Gallup Organization, 1989) revealed that more than two-thirds of Americans choose foods based on 'good' or 'bad' perceptions, a notion that is contrary to advice from nutrition and health experts who tout balance, variety and moderation as keys to healthful eating." "Nevertheless, the survey (The Gallup Organization, 1989) showed that more than half of all Americans are needlessly eliminating foods from their diets, even whole categories of foods like meats or dairy products, because they perceive them as 'bad' choices" (National Live Stock and Meat Board, 1991). "It is easy to understand how consumers become confused about the role meat should play in their diets; meat contains some fat and cholesterol, however, it is also a major source of important nutrients in the diet" (National Live Stock and Meat Board, 1991). "In fact, meat is what nutrition professionals refer to as 'nutrient dense,' that is, it has a high level of nutrients compared to calories; what must be understood is that 'meat,' 'fat' and 'health risks' are not synonymous terms and that the key words are balance, variety and moderation" (National Live Stock and Meat Board, 1994).

Smith (1990) stated that "Public-Health or Population Strategies for dietary intervention, like dietary guidelines or national dietary-education programs, are inappropriate (a) if through over-prescription they unnecessarily frighten millions of U.S. citizens who will not benefit (in life expectancy, quality of life or freedom from debilitation) from directed changes in their diet and/or (b) if such whole-population dietary intervention approaches deprive U.S. citizens of one of life's greatest pleasures--eating the foods they like."

"Furthermore," said Smith (1990), "The red-meat industries can accommodate dietary intervention programs that are based on either a High-Risk Strategy or a Population or Public Health Strategy provided that the myth of 'Good Foods/Bad Foods' is dispelled by those who advocate and administrate those strategies. Balance, variety and moderation are the key elements of describing and defining a prudent diet. Consumers must be made to understand that there are no `Good Foods' or `Bad Foods'; rather, there are `Good Diets' and `Bad Diets' or better yet--with opportunities to make informed food-purchase decisions in the marketplace and to be judicious in amounts of each food-product consumed--there are 'Prudent Diets.' The new red meats, modified in composition and sized-down since 1985, will fit in a prudent diet" (Smith, 1990).

CURRENT STATUS OF SCIENTIFIC THINKING REGARDING FAT, FATTY ACIDS AND HUMAN HEALTH: What is dietary fat? Fats in food are responsible for much of the textural difference and most of the characteristic flavors, aromas and tastes; fat also increases the feeling of satisfaction, or the "satiety," after a meal. Dietary fat is comprised of building blocks called fatty acids; fatty acids are of three types and most foods contain a combination of all three types. Saturated fatty acids (SFAs) make up a large part of coconut, palm, corn and hydrogenated vegetable oils; foods of animal origin that contain SFAs include meat, poultry, fish, butter, eggs, milk and cheese. Research studies by Bonanome and Grundy (1988) and Mattson and Grundy (1985) reveal that some SFAs raise blood cholesterol while some other SFAs do not. Bonanome and Grundy (1988) concluded "that stearic acid appears to be as effective as oleic acid in lowering plasma cholesterol levels when either replaces palmitic acid in the diet." The American Heart Association recommends that SFAs contribute less than 10% of daily calories, or one-third of total fat intake (National Live Stock and Meat Board, 1994).

Monounsaturated fatty acids (MUFAs) are also found in both animal and plant fats. Olive, canola and peanut oils are especially rich sources of the MUFAs (National Live Stock and Meat Board, 1991). When substituted for saturates, monounsaturates may help lower blood cholesterol levels (Mattson and Grundy, 1985; Bonanome and Grundy, 1988). The American Heart Association recommends that MUFAs not exceed 10% of daily calories or one-third of total fat intake (National Live Stock and Meat Board, 1994).

Polyunsaturated fatty acids (PUFAs) are mainly found in foods from plants such as sunflower, safflower, corn, sesame and soybean oils. Polyunsaturates can help lower blood cholesterol when substituted for saturated fatty acids (Mattson and Grundy, 1985; Grundy, 1986; Bonanome and Grundy, 1988).

Two fatty acids that are of omega-3 type are found in fish oils—eicosapentaenoic acid (EPA) and docohexaenoic acid (DHA). It has been hypothesized that because Eskimos and Japanese eat lots

more fish and have lower incidences of coronary heart disease (CHD) than U.S. citizens, who eat much less fish, that EPA intake and CHD incidence are related (Vitamin Cottage Health Hotline, 1999). M.D. William Connor (Clinical Nutrition and Atherosclerosis Laboratory, University of Oregon) says "It's not yet known what EPA may or may not do in human atherosclerosis but it is known that omega-3 oils lower blood fats and affect platelet function (during blood coagulation), reducing the tendency to thrombosis. DHA has been shown to be essential in rhesus monkeys to normal visual and mental functioning because DHA is found in high concentrations in the brain and retina. But, you can't simply take fish oil and go on eating all the eggs, bacon, meat and butterfat you want; the benefit comes from substituting fish for the foods that promote heart disease" (Vitamin Cottage Health Hotline, 1999).

A "Conference On Triglycerides And Omega-3s" (November 1998; New York, NY) was summarized by Omega Tech (1998) as follows: (1) Currently, assessing CHD risk primarily involves testing Total, HDL and LDL cholesterols but these measurements may not present the entire picture. Serum triglyceride levels are an independent risk factor for heart disease and dietary omega-3 fatty acids (DHA and EPA) are being recommended as an effective therapeutic intervention to combat hypertriglyceridemia. (2) C. Hennekens (Harvard Medical School) reported that reducing blood cholesterol to 200 mg/dl has failed to increase overall CHD survival and that omega-3 fatty acids (DHA and EPA) may reduce CHD by controlling arrythma, by modulating platelet reactivity and lowering triglyceride levels. (3) R. Krauss (Lawrence Berkeley National Laboratory) reported that elevated LDL cholesterol may not cause harm if the LDL particles are large, buoyant, Type A (rather than small, dense, Type B) and that intervention with omega-3 fatty acids can shift Type B LDL to less atherogenic Type A LDL particles. (4) M. Miller (Universitiy of Maryland Medical Center) reported that there is a significant association between blood triglyceride levels and increased CHD risk (independent of HDL levels), that the desired level of triglycerides in blood should be 100 mg/dl (rather than 200 mg/dl) and that for each 90 mg/dl rise in blood triglycerides above 100 mg/dl, the risk of CHD is increased by 14% in men and 37% in women. (5) M. Gaziano (Brigham and Women's Hospital) reported that even when low LDL is controlled for, the risk of death from CHD is three times higher when triglyceride levels are elevated. If triglycerides are normalized, the risk from low HDL is reduced by half. (6) W. Harris (University of Missouri Lipid Research Laboratory) reported that the omega-3 fatty acid dose for maintaining good health is as low as 200 mg/day and that recommending a greater weekly intake of oily fish (salmon, sardines, mackerel) and other DHA-rich foods (DHA-rich eggs) can help reduce death from heart attack by 29%. (7) H. Ginsberg (Columbia-Presbyterian Medical Center) said that dietary omega-3 fatty acids effectively lower serum triglycerides but not serum cholesterol. (8) W. Connor (Oregon Health Sciences University) reported that patients taking fish oil supplements have not been shown to have excessive bleeding, hemorrhagic stroke, glycemic control, insulin sensitivity or oxidative harm. (9) P. Kris-Etherton (Pennsylvania State University) reported that, to control blood triglyceride levels, the minimal daily intake of DHA and EPA should be between 300 and 500 mg (U.S. citizens presently consume only 150 mg per day).
Ross (1999) reported that people who have suffered heart attacks can reduce their risk of heart-related death by 30% by taking a fish oil capsule every day. A study reported in *The Lancet* concluded that a capsule of omega-3 fish oil each day reduced the combined risk of death, stroke and heart attack by 15% (most of the benefit was due to a 30% drop in the risk of heart-related deaths). The Italian study involved 11,324 men and women who had suffered a heart attack no more than three months before;

scientists believe fish oil may help the heart by lessening the inflammation involved in hardening of the artery walls (Ross, 1999).

Conjugated linoleic acid (CLA) is a collective term used to describe the positional and geometric isomers of the essential fatty acid, linoleic acid (Berry, 2000). One particular isomer, cis-9, trans-11, has been shown to be especially bioactive; this isomer is predominantly found in milk and meat. Results from numerous animal studies have linked consumption of CLA with a reduction in the development of tumors and the risk of various cancers, a decrease in the formation of and the reduction of already formed atherosclerosis, a reduction of body fat accumulation and prevention of diabetes (Berry, 2000).

According to Union Leader (1995), Dr. Ruth Kava (Director of Nutrition for the American Council on Science and Health) states "The more we learn about different types of fats, the less able we are to categorize them simply as good or bad; while most saturated fatty acids raise blood cholesterol levels, one of them, stearic acid, does not do so, according to recent research." "And, similarly, dietary cholesterol, long-avoided by millions of health-conscious people, may be problematic for only a relatively small portion of the population," said Dr. Kava (Union Leader, 1995).

Research on healthy men aged 20 to 35, half given a high-fat diet (39% of calories from fat) and half given a low-fat diet (22% of calories from fat), resulted in no decrease in blood cholesterol levels in either group (Agricultural Research, 1999b). Researchers, led by G.J. Nelson (ARS-USDA Western Human Nutrition Research Center), concluded that the reason no change occurred in patients' blood cholesterol level was that—although the low-fat diet should have lowered the blood cholesterol levels of those who ate it—it did not. It did not, the researchers believe, because they kept the ratios of types of fat the same—28% saturated, 33% monounsaturated, 6% monounsaturated trans-, 29% polyunsaturated and 4% other minor fats—and, it is the ratio of kinds of fats in the diet that determines contribution of fat in the diet to cholesterol level in the blood (Agricultural Research, 1999b).

Many nutrients have a wide range of acceptable dietary intakes between a necessary minimum intake and a safe upper limit that permits diverse individual choices; however, arbitrary advice to eat equal amounts of saturated, monounsaturated and polyunsaturated fats calls for careful evaluation and communication of important research evidence to avoid an inappropriate balance of dietary fats (Lands, 1999). For example there is a current American excess of omega-6 (n-6) eicosanoid-mediated disorders (e.g., thrombotic heart attack and stroke, cardiac arrhythmia, atherogenesis, arthritis, asthma, osteoporosis, tumor metastases) that accompanies unjustifiably excessive n-6 intakes (Lands, 1999). An adequately informed choice by Americans would probably favor decreasing the average intake of n-6 fats (e.g., linoleic acid, arachidonic acid) and increasing the intake of n-3 fats (e.g., eicosapentaenoic acid, docosapentaenoic acid and docosahexaenoic acid) (Lands, 1999).

A French research project entitled the "Lyon Diet Heart Study" demonstrated the heart-healthy benefits of a Mediterranean diet (rich in vegetables, fruits, whole grains, beans and fish) and documented that people with heart disease who followed the relatively high-fat Mediterranean diet lowered their risk of suffering a second heart attack by up to 70% (USA TODAY, 1999). The Mediterranean diet gets 30% to 40% of its total calories from fat, but only 8% comes from saturated fat, the fat that when deposited on artery walls can lead to a heart attack; the American Heart

Association still backs its own lower-fat diet for heart patients which calls for less than 30% of calories from fat and 7% from saturated fat (USA TODAY, 1999).

The Nutrition Action Newsletter (1995) states that, using 40 years of data from the Framingham Heart Study, the American Heart Association has created work sheets for health professionals to use to estimate their patients' risks of heart disease. For both men and women, the "Risk Factors" for heart disease are: (1) Age, (2) HDL Cholesterol, (3) Smoking Cigarettes, (4) Having Diabetes, (5) Having Left Ventricular Hypertrophy, (6) Total Cholesterol, and (7) Systolic Blood Pressure. As an example, a 54-year old woman (8 points), with total cholesterol of 227 (2 points), HDL, "good," cholesterol of 52 (-1 point), and systolic blood pressure of 131 (2 points), who doesn't smoke (0 points), have diabetes (0 points), or have left ventricular hypertrophy (0 points), ends up with a total of 11 points. According to charts presented in the Nutrition Action Newsletter (1995), that woman has a 3% chance of developing coronary heart disease in the next five years; her risk over the next 10 years is 6% (compared to 8% for the average woman of her age).

THE NEED FOR CONCERN ABOUT DIET/HEALTH/NUTRITION: The 10 leading causes of death, in 1987, according to the U.S. Surgeon General's Report (Health and Human Services, 1989) and in 1991 (U.S.A. TODAY, 1992) in the U.S. were as follows (Table 12):

Table 12. Ten Leading Causes Of Death In The United States In 1987 and 1991.

1987		1991	
(1) Heart Disease	35.7%	(1) Heart Disease	33.2%
(2) Cancer	22.4%	(2) Cancer	23.8%
(3) Stroke	7.0%	(3) Stroke	6.7%
(4) Accident and Injury	4.4%	(4) Accident and Injury	4.2%
(5) Chronic Lung Disease	3.7%	(5) Chronic Lung Disease	4.1%
(6) Pneumonia and Influenza	3.2%	(6) Pneumonia and Influenza	3.5%
(7) Diabetes mellitus	1.8%	(7) Diabetes mellitus	2.3%
(8) Suicide	1.4%	(8) Suicide	1.4%
(9) Liver Disease and Cirrhosis	1.2%	(9) AIDS	1.4%
(10) Atherosclerosis	1.1%	(10) Murder/Law Enforcement Deaths	1.2%

An article in the Coloradoan (1995) compared top-ten causes of death in the United States and the rest of the world. Heart disease and stroke kill millions of people, no matter where they live but the differences between the top causes of death in the U.S. and worldwide are striking (Table 13):

Table 13. Ten Leading Causes Of Death Worldwide And In The USA In 1993.

Top Ten Killers Worldwide	Top Ten U.S. Killers

(1) Ischemic heart disease	(1) Heart disease
(2) Pneumonia (mostly children)	(2) Cancer
(3) Stoke	(3) Stroke
(4) Diarrhea and dysentery	(4) Asthma/emphysema
(5) Asthma/emphysema	(5) Accidents (including auto)
(6) Tuberculosis	(6) Pneumonia/influenza (mostly elderly)
(7) Malaria	(7) Diabetes
(8) Falls, fires, drowning, accidents	(8) AIDS
(9) Measles	(9) Suicide
(10) Other heart disease	(10) Homicide

Source: World Health Organization, National Center for Health Statistics (1993).

The U.S. Surgeon General has concluded that "The food we eat is killing us" because:

(a) Diet plays a role in five (numbers 1, 2, 3, 7 and 10; in 1989) and in four (numbers 1, 2, 3 and 7; in 1991) of the top-ten leading causes of death (numbers refer to rank in the table above),

(b) More than 34 million U.S. citizens, in 1989, were obese, and

(c) Nutritional excesses and deficiencies in specific population groups persist, causing heavy costs to society, families and individuals.

According to Vitamin Cottage Health Hotline (1999a), the leading causes of death in the U.S. in 1994 were: (1) Heart Disease (743,000 people); (2) Cancer (530,000 people); (3) Stroke (150,000 people); (4) Adverse Drug Reactions (106,000 people); (5) Pulmonary Disease (101,000 people), and; (6) Accidents (90,000 people).

RELATIONSHIP OF DIET TO HEALTH—NUTRITIONAL DEFICIENCIES VS. DIETARY EXCESSES AND IMBALANCES: Until the early 1950s, the relationship of diet to health focused primarily on nutritional deficiencies resulting in diseases, such as pellagra and scurvy. Since that time, the abundant food supply, fortification of some foods with critical trace nutrients and improved methods for determining and improving the nutrient content of foods, have greatly reduced the prevalence of nutritional deficiency diseases in developed countries (American Heart Association, 1990). Diseases of dietary excesses and imbalances continue to jeopardize the health status of many Americans. The scientific evidence supporting the association of dietary excesses with coronary heart disease, some cancers, stroke, diabetes mellitus, obesity, and atherosclerosis continually grows stronger (American Heart Association, 1990). Dr. Elizabeth Whelan (President of the American Council on Science and Health) says "Eating a balanced diet and lowering the total amount of dietary fat is more important than being overly concerned about the exact type of fat one eats; too much fat of any kind can lead to weight gain and obesity" (Union Leader, 1995).

Obesity is widespread throughout affluent countries and, in the United States alone, is estimated to afflict 34% of the adult population (Health and Human Services, 1985). Obesity is widely considered to be one of the major public health problems, being associated with substantially increased morbidity and mortality, as well as psychological problems, reduced economic achievement, and discrimination

(Wadden and Stunkard, 1993). While we decreased our dietary fat intake from about 41% of total calories in the 1960s to the current 34%, total caloric consumption per person increased by about 200 kcal/day in the last decade, suggesting that our present over-emphasis on eating low fat foods may be contributing to the alarming increase in overweight among U.S. adults (Allred, 1995). According to Foreyt and Poston (1997), "While it would not harm most Americans to further reduce their fat intake, we believe that prevention efforts should focus on reducing total caloric intake by cutting portion sizes, since it is primarily overeating that is harming the most Americans and because there is good evidence that reducing total caloric intake is the most important factor in weight loss. Balance, variety and moderation still appears to be the best dietary approach to weight management" (Foreyt and Poston, 1997). Foreyt and Poston (1997) considered the pertinent research literature and concluded that obesity is a serious health concern in the U.S. and in other countries that pattern their diet after the U.S. model; causes of obesity are multifactorial and include food choices as well as genetic susceptibility and lifestyle aspects.

"The world's population is growing--at the waist," said Briscoe (2000), "a Worldwatch Institute study has determined that, for the first time in history, there may be as many people overweight--1.1 billion--as underweight."

According to Food Processing (1999c) there is a battle for healthy eating and consumers are losing it. Dr. Marcus Elliott (Balance Bar Company) says "We are a nation having difficulty managing what we eat and when; interestingly, the younger you are, the more likely you'll be careless about food intake, while the older you are, the more likely you'll be concerned about balance." Americans are, according to a Balance Bar Company survey: (a) Battle Weary (18%), Constantly watch what they eat and worry about calories. (b) Surrenderers (42%) Just eat what they like. (c) Balanced (42%) Mostly, have won the nutrition war and try to eat foods high in protein and vitamins. But, among all three groups, hunger is one of the biggest motivating factors for junk food binges; 62% of all survey respondents said they eat whatever is handy when they get hungry, even if it's not a healthy food (Food Processing, 1999c).

Smith and Morgan (1999) discussed self-indulgence trends in foods citing statements from: (a) U.S. News & World Report, May 24, 1999—"A virtually uninterrupted economic expansion in the U.S., sustained low inflation and a soaring Dow Jones Industrial Average have created an era of indulgence—the urge to splurge." (b) Tactical Retail Monitor, May 1999—"U.S. citizens are spending $35 billion per year on non-essential reward items." (c) Roper Research Worldwide, May 1999—"Here's what Americans consider splurge-worthy—big food (big steaks, big scoops, big portions and a big move away from low-fat and no-fat products). More than half of all Americans eat and drink what they want despite the nutritional value, while 40% say they are not sacrificing taste for lower calories." (d) Information Resources, 1999—"People are moving away from low-fat, to higher-fat, products largely because of disappointment in taste with low-fat foods."

DIETS INTENDED TO REDUCE BODY WEIGHT AND/OR IMPROVE HUMAN HEALTH: Increasingly the medical community is embracing the idea that a low-fat diet packed with fruits and vegetables may be one of the best ways to reduce your risk of cancer (USA TODAY, 1999). Two recent books—Dr. Gaynor's Cancer Prevention Prevention Program by M.D. Mitchell Gaynor (Director of the Integrative Medicine Program at Strang Cancer Prevention Center) and The Breast Cancer Prevention Diet by M.D. Bob Arnot (Chief Medical Correspondent for NBC News)—

speculate that nutrition alone can save millions of lives (USA TODAY, 1999). M.D. Abby Block (Chair of the American Cancer Society's Committee for Nutrition and Physical Activity) challenges Arnot's statements as extrapolations and trends and not hard scientific facts and says Gaynor's opinions are based on populations and migrations but not upon clinical studies and that there are no clinical studies to scientifically prove his hypothesis. What will help? The American Cancer Society says "Reduce fat, whether it's animal products or other sources, and increase physical activity" (USA TODAY, 1999).

Hellmich (1999) described Suzanne Somer's diet plan—"Get Skinny On Fabulous Food"—which includes six guidelines, one of which is "Eat protein and fats such as meat, fish and eggs as well as butter and cream with vegetables." The logic of her argument is the same as that espoused by Susan Roberts (USDA Human Nutrition Research Center on Aging at Tufts University) and David Ludwig (Children's Hospital, Boston) who say "Ever feel hungry a few hours after a big meal? The cause might be carbohydrate-containing foods, which cause a rapid spike in your blood sugar. This musters extra insulin into the blood; but, the high insulin makes blood sugar crash and suppresses the fat fuels as well, leading to that famished feeling that makes you overeat? (Beef, 1999c). A study at Children's Hospital in Boston and the USDA Human Nutrition Center at Tuffs University has provided the first solid evidence that carbohydrate foods with a high glycemic index (GI)—those that are rapidly digested and absorbed—contribute to obesity; high GI meals (e.g., most starch foods) induce a sequence of hormonal and metabolic changes that promote overeating in obese people (Beef, 1999c).

The canons of losing weight consist of ten items: (1) Think long-term, (2) Do it yourself, (3) Prepare the way, (4) Think fruits, grains and vegetables, (5) Control portion sizes, (6) Eat three meals a day, (7) Maintain your program, (8) Exercise, exercise, exercise, (9) Don't overdo it, and (10) Think "activity"; Think "play" (Modern Maturity, 1998). Interestingly, the latter article concluded that the major motivator for people in midlife is not their looks but their health (Modern Maturity, 1998).

American Institute for Cancer Research (2000) has the following "Diet And Health Guidelines For Cancer Prevention": (1) Choose a diet rich in a variety of plant-based foods. (2) Eat plenty of vegetables and fruits. (3) Maintain a healthy weight and be physically active. (4) Drink alcohol only in moderation, if at all. (5) Select foods low in fat and salt. (6) Prepare and store food safely. (7) Do not use tobacco in any form. Interesting, no mention is made of meat *per se* as food to avoid consuming for cancer prevention in the Guidelines of the American Institute for Cancer Research (2000).

<u>IS RED MEAT CONSUMPTION RELATED TO INCIDENCE OF HUMAN CANCER?</u>: The World Cancer Research Fund (WCRF) issued a report in September, 1997 (Rocky Mountain News, 1997) that concluded "Cancer is preventable and eating less meat and more fruits and vegetables could reduce cases of this disease by up to 40% per year." Fifteen scientists from 9 countries assessed 4,000 studies on diet and cancer and concluded that people should change to a more plant-based diet, and meat—if eaten at all—should be limited to less than 3 ounces or one portion a day, should be well-cooked and not charred and should be eaten only occasionally if grilled, cured and/or smoked. The most prominent member, though, of the WCRF was not thoroughly convinced by this latest study; Dr. Richard Doll said that a balanced diet would reduce the risk of developing cancer but added "the jury is still out on the aspects of diet that cause cancer" (Rocky Mountain News, 1997).

Byers *et al*. (1997) reported that colorectal cancer (CRC), the leading cause of cancer in nonsmokers, may be up to 80% preventable through screening and alteration of lifestyle factors; they concluded that it is a myth that red meat consumption causes CRC and said there is only "some evidence of a weak association between eating red meat and getting CRC. McBean (1997) reviewed most of then-existent epidemiological studies and concluded that the association between consumption of red meat (beef, pork, lamb, processed meat) and specific kinds of cancer (CRC, breast, lung, prostate, other) is inconsistent. She concluded that although it has been suggested that meat components such as fat, protein or iron, or chemicals formed during the cooking of meat might be carcinogenic, these hypotheses remain unproven, and—on the contrary—meat contains some components, such as selenium and conjugated linoleic acid which may protect against cancer (McBean, 1997). National Meat Association (1999) announced that a team of Swedish researchers at the Karolinska Institute have refuted the hypothesis that heterocyclic amines—found in charred parts of meat and fish—are partially responsible for an increased risk of cancer. The researchers interviewed 1,600 adult Swedes and concluded that: (a) There was no consistent relationship between heterocyclic amine intake and cancer risk. (b) Rates of colon and rectal cancer actually decreased as heterocyclic amine intake rose. (c) High heterocyclic amine consumption was associated with a slight rise in the overall incidence of bladder cancer but was not related to risk for bladder cancer. (d) Ingestion of the meat compound was not a major cause of cancer.

Beef Business Bulletin (1999) reported that the implied link between red meat and cancer is not as strong in the United Kingdom as it is believed to be in the United States. According to Dr. Michael J. Hill (D.Sc., F.R.C., United Kingdom), "The risk of cancer has more to do with a decrease in the intake of green and yellow vegetable and there are numerous studies that show no relationship between meat and cancer" (Beef Business Bulletin, 1999). Dr. Hill criticized a 1997 World Cancer Research Foundation (WCRF) report concluding that red meat is a risk factor for colon cancer and perhaps other cancers saying that the report was not received well in Europe because the WCRF panel was dominated by vegetarians who used the panel to support their own cause (Beef Business Bulletin, 1999). American Institute for Cancer Research (1999) believes that 60 to 70% of all cancer cases could be prevented through sensible dietary choices, maintaining a healthy body weight, being physically active and not smoking.

American Institute for Cancer Research (2000) has the following "Diet And Health Guidelines For Cancer Prevention": (1) Choose a diet rich in a variety of plant-based foods. (2) Eat plenty of vegetables and fruits. (3) Maintain a healthy weight and be physically active. (4) Drink alcohol only in moderation, if at all. (5) Select foods low in fat and salt. (6) Prepare and store food safely. (7) Do not use tobacco in any form. Interesting, no mention is made of meat *per se* as food to avoid consuming for cancer prevention in the guidelines of the American Institute for Cancer Research (2000).

<u>IS RED MEAT CONSUMPTION RELATED TO HUMAN OBESITY?</u>" The Gallup Organization (1993) reported that health professionals strongly concur with the total diet concept; almost all agree that the amount of fat consumed should be managed over an entire day rather than by a single meal or food and that, in making dietary recommendations they try to balance good nutrition with good taste. While 54% of physicians reported to The Gallup Organization (1993) that they think the nutrient value

of red meat makes it an important part of a healthy diet, 51% believe an effective way to reduce calories is to eliminate or cut down on red meat.

According to the Courtland Journal (1995) "It's unhealthy. It's fattening. It's bad for you. That seems to be all I read about eating red meat today," said Dr. Ruth Kava (Director of Nutrition for the American Council on Science and Health). "Meat is a good, highly nutritious food and like all other foods is best consumed in moderation within a balanced, varied diet," said Dr. Kava, "If you like meat, eat some today (Courtland Journal, 1995).

The USDA standard serving for meat is 2-3 ounces (Foreyt and Poston, 1997). The red meat industry has widely advertised that it has reduced fat content of its products by 20 to 40% in the past two decades. Many cookbooks and restaurant portions start at 7 ounces and can be as high as 38 ounces for one person (Young and Nestle, 1995). The idea that we are reducing fat consumption appears to promote overeating (Allred, 1995; Foreyt and Poston, 1997).

IS RED MEAT CONSUMPTION RELATED TO CORONARY HEART DISEASE IN HUMANS?: Phelps (1992) reported that "Claims that diets high in saturated fats from meat and dairy products are linked to heart disease have been distorted by researchers selectively quoting from trials that support their beliefs, according to an analysis by Dr. Uffe Ravnskov (Lecturer on Kidney Disease, University of Sweden in Lund, Sweden), who published his allegation in the British Medical Journal." "Dr. Ravnskov," said Phelps (1992), "accused doctors of adopting unscientific methods to prop up their claim that high cholesterol levels in blood trigger heart disease." "After a thorough examination of all of the trials in the theory--involving 114,000 people--which have been conducted over almost 30 years, he concluded that the benefits of lowering cholesterol through the diet have been exaggerated by a tendency in trial reports, reviews and other papers to cite supportive research only," said Dr. Ravnskov (Phelps, 1992).

In the latest bizarre twist of food fate, the accepted wisdom that all fat is bad and that animal fat is especially so, is coming under increasing attack; cheeseburgers could be on their way to rehabilitation as cancer fighters while soybean oil could become a new culinary culprit (Neff, 1998). Bruce Watkins (Purdue University) says “Over the past few years, the emphasis has been on reducing the total amount of fat in a variety of foods but many nutritionists looking at the fat issue and disease risk feel that not only should we be reducing the amount of fat in the diet, but care should be taken to get the right balance of fats; we need a mixture of different fats from different animal and vegetable sources to lower risk of heart disease and cancer” (Neff, 1998). Among the specific health-focused trends Watkins and others see in fat and oils are (Neff, 1998): (a) Growing concern with increasing omega-3 fatty acids in the diet, including use of fish oil, which received generally recognized as safe (GRAS) approval from the FDA as a food ingredient. (b) New attention to the positive role of conjugated linoleic acids (CLAs) found in, among other things, beef and milk fat. (c) Finding alternatives for trans- fatty acids and hydrogenated oils, believed to play a role in raising LDL cholesterol and lowering HDL cholesterol in the bloodstream. (d) Developing high oleic oils, whose antioxidant properties make them one area where health and processing characteristics jibe. Artemis Simopoulos (Center for Genetics, Nutrition and Health) believes that eating the right balance of fats (a diet with 40% of calories from fat but with fat high in omega-3 fatty acids) rather than reducing them, is key to improvements in a wide variety of

health conditions (Neff, 1998). Among the most promising avenues would be altering livestock feed to increase omega-3 fatty acids and conjugated linoleic acid in beef (Neff, 1998).

A parity study of beef with other dietary proteins in healthful diets was conducted to examine the impact of lean red meat and lean white meat on human blood cholesterol levels (Wood, 1999). The parity study was conducted over a nine-month period using Johns Hopkins University men and women with mild to moderate blood cholesterol levels. The participants were free to make their own choices regarding food selection and preparation based on either "The Lean Red Meat Diet" or the "The Lean White Meat Diet." Results were that: (a) Both diets lowered Low Density Lipoprotein ("Bad") cholesterol and increased High Density Lipoprotein ("Good") cholesterol in patients' blood, and (b) Both diets caused changes in blood cholesterol levels that would result in about a 10% reduction in the risk for Coronary Heart Disease. Dr. Peter O. Kwiterovich (Johns Hopkins University Lipid Clinic) said "Since lean cuts of red meat are now readily available to consumers, eliminating lean red meat is unnecessarily restrictive—and, advising against consumption may actually negatively impact long-term dietary compliance" (Wood, 1999).

Young *et al*. (1999) reported results of a study (published in Archives Of Internal Medicine and described in a feature article in USA TODAY) conducted by M.D. Michael Davidson (Chicago Center for Clinical Research) which concluded that patients with high blood cholesterol levels who went on diets that included 6 ounces of lean red meat, five or more days a week, had the same health benefits as those who ate 6 ounces of white meat. Dr. Davidson summarized his findings by saying "Lean red meat is just as effective in lowering cholesterol as chicken. One of the problems of low-fat diets is that people stay on them for only a few weeks. Lean red meat gives people a greater variety of food to choose from" (Young *et al*., 1999).

ARE THERE GOOD THINGS, NUTRITIONALLY, ABOUT RED MEAT?: The U.S. Centers for Disease Control and Prevention estimates that approximately 700,000 toddlers and 7.8 million women in the United States today have iron deficiencies (California Beef Council, 2000). People typically eat less as they grow older, and too often they don't get enough of the nutrients for good health; as a result, iron deficiencies are not uncommon in older Americans and as many as 95% of them may not get the zinc they need to keep their immune systems strong and appetites healthy (California Beef Council, 2000). Pregnant women have special nutritional needs. To ensure the good health of both expectant mother and fetus, the March Of Dimes Birth Defects Foundation and International Food Information Council report that protein intake during pregnancy should be 20% higher, zinc intake 25% higher, and Vitamin B-6 and B-12 intake 28% and 10% higher, respectively (California Beef Council, 2000).

Not enough attention is paid to the contributions of key vitamins and minerals that are provided by one 3-ounce serving of beef; beef's contributions of key nutrients (expressed as a percentage of Daily Values in a 2,000 calorie reference diet) are 9% of calories, 50% of protein, 14% of iron, 39% of zinc, 37% of Vitamin B-12 and 16% of Vitamin B-6 (National Cattlemen's Beef Association, 1996).

When it comes to energy, some foods have a competitive advantage; following is the quantity of other popular food sources required to get the same amount of three nutrients found in a 3-ounce cooked serving of beef: (1) Zinc—3 ounces of beef or three 4-ounce cans of tuna; (2) Iron—3 ounces of beef

or five ¼ cups of spinach, and; (3) Vitamin B12—3 ounces of beef or eight ½ chicken breasts (Beef, 1999b; using USDA Nutrient Database for Standard Reference, Release 12).

Beef is "smart food" (Beef, 1999). A five-person panel of cognition experts concluded that beef consumption plays a critical role in normal brain growth and function by guarding against iron and zinc deficiencies. Research evidence, according to M.D. Nancy Krebs (University of Colorado), shows that: (a) 40% of Americans (56% of infants) don't meet their needs for iron. (b) 73% of Americans (85% of infants) don't meet their needs for zinc. (c) Beef supplies 58% of the iron and 67% of the zinc in the American diet (Beef, 1999). Dr. Krebs said (Beef, 1999): (1) "Even mild, short-term deficiencies may impair mental activity." (2) "Beef should first be introduced to 6-month old infants." (3) Beef consumption should continue through life."

Good news for pork and other meats; the Centers for Disease Control announced that meat, poultry and seafood are the best sources of dietary iron (Pork '98, 1998c). In its study "Recommendations to Prevent and Control Iron Deficiency in the United States," CDC officials revealed that iron deficiency is the most prevalent nutritional deficiency in the world and that meat, poultry and fish are the only foods that contain heme iron, a form that is two to three times more easily absorbed by the human body (pork and beef rank highest in absorbability) (Pork '98, 1998c).

Researchers at Baylor College of Medicine have suggested that a high-protein, high-monounsaturated fat diet may favor positive changes in the lipoprotein profile (Quarterly Research Update, 1998). Research evidence indicates that overweight human subjects with Type II diabetes and dyslipidemia need a diet which includes lean beef that will result in weight loss and lower plasma LDL without adversely affecting glucose and HDL levels; the diet is composed of 25% of protein (from lean red meat), 40% from fat and 35% from carbohydrates (Quarterly Research Update, 1998).

A common type of fat in beef may prevent the adult-onset of diabetes; research conducted at Purdue University and Pennsylvania State University found that conjugated linoleic acid (CLA) can prevent the onset of diabetes in laboratory animals (Render, 1998). Previous research studies have shown that CLA can also prevent the onset of certain types of cancer and can reduce the number of mammary, skin and stomach tumors in laboratory animals; when fed to animals it also reduces their body fats and increases lean muscle tissue (Render, 1998). "This research adds to the wealth of other data supporting beef's positive dietary role" said Mary K. Young, M.S. R.D. (National Cattlemen's Beef Association) "CLA is one of the most exciting new discoveries in meat and will give consumers even more reasons that beef should be included in their diets" (Render, 1998).

Experts have touted the "evils" of fat for two decades—many refer to it as "a guilty pleasure"—now, though, experts have begun parroting the advantages research has uncovered (Montana Beef Council, 1999). Why? Because monounsaturated fat is protective against heart disease and because conjugated linoleic acid (CLA) has several human health benefits. Conjugated linoleic acid (abundant in meat and dairy products) has the following benefits (Montana Beef Council, 1999): (a) It inhibits development of tumors and sloughs-off existing ones. (b) It lowers total blood cholesterol and "bad cholesterol" (low density lipoproteins). (c) It reduces body fat (it is a fat that "burns" other fats). (d) It may regulate blood glucose levels thereby delaying onset of diabetes.

A national best-selling book, Protein Power by M.D. Michael R. Eades and M.D. Mary Dan Eades, is helping beef and other protein sources gain popularity among health-conscious consumers (Beef, 1998b). The Eades book plus several others on the best-sellers list—Dr. Atkins New Diet Revolution, Sugar Busters, The Zone—all propose that people follow high-protein/low-carbohydrate diets if they wish to lose weight, feel fit and boost health. Dr. Michael R. Eades says "You can enjoy steaks, burgers and roasts. There are lots of good things about beef besides the fact that it taste good" (Beef, 1998b). Among beef attributes are that it is: (a) A complete hypo, non-allergenic protein (meaning no one is allergic to it), (b) A conjugated linoleic acid that helps fight cancer, (c) High in Vitamin B-12, which the human body can't get from plant sources, (d) Contains lipoic acid—an antioxidant, (e) A good source of zinc—a major component of the immune system, and (f) High in heme iron (Beef, 1998b).

DOES RED MEAT EQUAL FAT? What must be understood is that meat does not equal fat; meat is a nutrient-dense food--for the calories delivered, lean meat is one of the best sources of iron, protein, zinc and B vitamins (National Live Stock and Meat Board, 1991). And, when lean cuts are selected, meat can fit easily in a healthy diet. In fact, as purchased at the supermarket, beef cuts are 27% leaner than they were in the early 1980s; pork is 43% leaner as purchased at the supermarket (National Live Stock and Meat Board, 1991). Thanks to livestock producers' use of improved breeding and feeding practices and closer trimming of retail cuts by meat retailers, today's meat has more lean and less fat. The National Beef Market Basket Survey (Savell et al., 1988) found that on average, beef in today's meat case is 27% leaner than early 1980's beef. The survey found that the average thickness of fat around the edge of retail cuts was less than 1/8 inch with over 40% of retail cuts having virtually no external fat (Savell et al., 1988). According to Pork '98 (1998b), consumers asked for leaner pork and they got it; thanks to the focus placed on feeding, genetics and management practices, by pork producers, fresh pork's skinny profile now shows that it has 31% less fat and is 29% lower in saturated fat than it was a decade ago.

Feeding conjugated linoleic acid (CLA) to finishing hogs: (a) Improves feed efficiency and daily gain, (b) Reduces backfat thickness, (c) Improves color, marbling and firmness of loin muscles and firmness of hams and bellies, and (d) Improves ground pork color and shelflife (Pork '99, 1999) as well as increasing CLA concentration in tissues that, when eaten, are beneficial to health of consumers.

ARE THERE LEAN CUTS OF BEEF AND PORK?: Working with the American Heart Association, the Beef Industry Council (1995) of the National Cattlemen's Beef Association has identified "The Skinniest Six" beef cuts. The Beef Industry Council (1995) says, in its point-of-purchase materials, "When selecting beef at the meat case, ask for one of beef's skinniest cuts. Nutritionists define a serving of meat as three ounces; four ounces of uncooked, boneless, trimmed meat will usually provide a 3-ounce serving."

Table 14. The Skinniest Six Cuts Of Beef.

CUT	CALORIES	IRON (mg)	FAT (g)	CHOLESTEROL (mg)
Eye of Round	155	1.65	5.5	59

Round Tip	162	2.50	6.4	69
Top Loin	172	2.10	7.6	65
Top Round	162	2.45	5.3	72
Tenderloin	174	3.05	7.9	72
Sirloin	177	2.85	7.4	76

SOURCE: USDA Handbook 8-13 (As Revised in 1986).

According to USDA (1996), retail beef cuts have 27% less fat than 10 years ago; the latter report cited a Texas A&M University study analyzing fat-trim levels on retail cuts with 1/8-inch fat trim, as compared to the ½-inch fat trim that was popular a decade ago. Results of that study follow (Table 15):

Table 15. Fat Content In Beef Servings That Differ In Outside-Fat Thickness On Cuts.

	Grams Of Fat In A 3-Ounce Cooked Serving			
	Fat Left On Outside Of Cuts			
	½"	¼"	1/8"	Zero
Top Sirloin Steak				
All Fat Analyzed	15.33	13.10	12.02	8.48
All Fat Trimmed	7.42	6.12	5.95	5.78
Chuck, Arm Pot Roast				
All Fat Analyzed	22.08	20.24	17.60	14.46
All Fat Trimmed	8.48	7.05	6.76	6.46

In a new advertising campaign in the Journal of the American Dietetics Association, the beef industry is encouraging a new look at beef in contemporary recipes (Angus News, 1997); among suggestions presented in the advertising to dietitians are: (a) In choosing the leanest cuts, remember to look for the words "loin" and "round" in the name. (b) Before cooking, trim the fat; that way you'll cut the overall fat content of the beef by up to 50%. (c) For tender cuts from the loin, consider lowfat cooking methods such as broiling, pan-broiling, grilling or rack roasting; for less tender cuts such as the round, use moist-heat methods like braising or stewing, or marinate to tenderize. (d) When serving a 3-ounce cooked portion of beef, start with about 4 ounces of raw, boneless meat. A 3-ounce portion of beef is about the size of a deck of cards.

The Pork Market Basket Survey (Buege, 1990) found that, on the average, fresh pork in today's meat case is 43% leaner than in 1983. The average thickness of fat around the edge of retail pork cuts was 1/8 inch, down from the standard 1/4 inch in the early 1980s (Buege, 1990).

Pork '98 (1998a) reported that consumers concerned about maintaining a healthy heart received one more reason to pig out; the American Heart Association (through its Food Certification Program) has given several pork products the nod to carry its Heart-Check logo. So far, pork roasts, tenderloins, some chops and ham filets have qualified; companies whose products have won approval include: Farmland Foods, Premium Standard Farms, Swift and Company, Armour

Food Company, and Smithfield Packing Company (Pork '98, 1998a)

NUTRIENT CONTENT OF RED MEAT VERSUS WHITE MEAT:

How does beef stack up—in calories, cholesterol and fat—when compared to pork tenderloin, chicken breast and turkey breast? When all four products are 3-ounce servings, trimmed after cooking, USDA (1990) Handbook 8-13 data reveal that beef top round, pork tenderloin, chicken breast and turkey breast contained, respectively, 4.2, 4.1, 3.0 and 3.0 grams of fat; 153, 139, 140 and 100 calories, and 71, 67, 72 and 74 milligrams of cholesterol. Actually, there is very little difference in fat, calories and cholesterol in same-size servings of beef, pork, chicken and turkey.

A campaign entitled "Today's Beef. The New Way To Eat Lean" in the Journal of the American Dietetic Association includes a graph with the heading "The Good News: There Are Seven Cuts Of Beef That Fall Between The Skinless Chicken Breast And Thigh In Terms Of Total Fat" (National Cattlemen, 1997). That graph is represented in tabular form as follows (Table 16):

Table 16. Comparison Of Fat Content Of Chicken And Beef Cuts (3-Ounce Cooked Servings; Lean Only).

Chicken Cut	Beef Cut	Saturated Fat (grams)	Total Fat (grams)
Breast		2.0	3.0
	Eye Round	1.5	4.2
	Top Round	1.9	5.5
	Round Tip	2.1	5.9
	Top Sirloin	2.4	6.1
	Bottom Round	2.1	6.3
	Top Loin	3.1	8.0
	Tenderloin	3.2	8.5
Thigh		2.6	9.2

SOURCE: USDA Handbooks 8-5 and 8-13.

Fat content (in grams) of ten pork, beef, chicken, turkey and fish items was compared using data from USDA and National Pork Producers Council (Pork '98, 1998b). Rank according to grams of fat in a serving (3 ounces; cooked, trimmed, boneless except one-half cup of tuna salad) were' (1 lowest) Skinless, Roasted Chicken Breast, 3.0; (2) Roasted Pork Tenderloin, 4.1; (3) Roasted Pork Loin Roast, 6.1; (4) Broiled Beef Top Loin, 6.2; (5) Broiled Pork Top Loin Chop, 6.7; (6) Broiled Beef Tenderloin, 8.0; (7) Skinless, Roasted Chicken Thigh, 9.3; (8) Ground Turkey, 11.8; (9) Breaded Cod Fillet, 12.0; (10 highest) Tuna Salad, 19.0 (Pork '98, 1998b).

American Heart Association (AHA) certifies meat and poultry products, allowing such products to carry the AHA Heart-Check Mark if the item is "extra lean" and meets the following nutritional requirements per 100 grams (Meat & Poultry, 1998): (a) Contains less than 5 grams of total fat, (b) Contains less than 2 grams of saturated fat, (c) Contains less than 95 mg of cholesterol, and (d) Has a sodium value of 480 or less.

NUTRITION LABELS: Sofos *et al*. (1995) examined biological/enzymatic degradation of cholesterol in beef tallow and found that several microorganisms (e.g., *Leuconostoc cremoris, Serratia marcescens* ATCC 13880) were capable of degrading more than 50% of the cholesterol in the culture medium. The futility of this approach, though, is that the more we learn about relationships between dietary cholesterol, blood cholesterol and coronary heart disease the less viable is such option because the contribution of reduced-cholesterol foods to the well-being of humans can now be challenged (Sofos et al., 1995). The U.S. Department of Agriculture has--in 1992--modified its concept of classifying food according to "basic food groups" and now offers dietary advice to the consuming public via the "Food Guide Pyramid."

Value of nutrition information sources for providing useful information to consumers (Beef, 1998a) is presented in Table 17.

Table 17. Value Of Nutrition Information To Consumers.

(1) 83% Doctors	(6) 74% Newspaper Articles
(2) 79% Women's Magazines	(7) 73% Other Television Programs
(3) 78% Dietitians/Nutritionists	(8) 73% Nurses
(4) 76% Specialty Magazines	(9) 58% News Magazines
(5) 75% Television News	(10) 55% Radio News

Foods in the supermarket must now have nutrition labels (Figure 1) that contain information (Nutrition Facts) regarding serving size in grams; calories and calories from fat in caloric units; and total fat, saturated fat, cholesterol, sodium, total carbohydrates, fiber, sugars and protein in both grams (or milligrams) and as Percent Daily Values (based on a 2,000 calorie diet). The "Food Guide Pyramid—A Guide To Daily Food Choices" is a visual depiction of recommendations from USDA/USDHHS (1992) that is intended to assist people in deciding what to eat, each day, to have a complete, nutritious and healthful diet. Its slogan is "Use the Food Guide Pyramid to help you eat better every day….the Dietary Guidelines Way." Its recommendations are: (a) Start with plenty of Breads, Cereals, Rice and Pasta (6 to 11 servings per day); Vegetables (3 to 5 servings per day); and Fruits (2 to 4 servings per day), (b) Add 2 to 3 servings per day from the Milk Group and 2 to 3 servings per day from the Meat Group, (c) Go easy on the fats, oils and sweets, the foods in the small tip of the Pyramid, (d) Each of these food groups provides some, but not all, of the nutrients you need, and (e) No one food group is more important than another—for good health you need them all (USDA/USDHHS, 1992). For the year 1996, Grain Foods—the foundation of the USDA/USDHHS Food Guide Pyramid—grabbed six of the top ten slots for fastest growing foods and beverages over the past 10 years; poultry, skim/low-fat milk, cheese and carbonated soft drinks captured the other four spots (National Eating Trends, 1997).

Figure 1. Nutrition Labels For Foods.

According to TRENDS--1997 (this question was not asked in TRENDS--1998 or TRENDS--1999), 45% of shoppers find the nutrition label wording and format "very useful," 45% find the nutrition label "somewhat useful," 3% find it "not useful" and 8% don't read the nutrition label." When asked, "What do you find useful about nutrition labels?" shoppers responded (TRENDS—1997) as follows (Table 18):

Table 18. Consumer Opinions Of Usefulness Of Nutrition Label Information.

Item	"Very" or "Somewhat" Useful	Item	"Very" or "Somewhat" Useful
Fat content	61%	Vitamin content	13%
List of ingredients	37%	Sugar content	10%
Number of calories	30%	Carbohydrate amount	5%

Salt levels	30%	Protein amount	3%
Cholesterol levels	16%	Serving size & fiber amount	2% & 2%

Texas Beef Council (1999) working with HEB supermarkets (San Antonio, TX), developed a unique beef retail campaign focusing on nutrition; called "Healthy Living," the campaign involves use of nutritional case cards and meat case display. The case cards and banners use concise, easy-to-read messages about beef's essential nutrients. Floor graphics carry the tagline "Today's Beef, More Than Just Great Taste" and packages, case cards and display case banners bear the words "Did You Know?" followed by nutrition information verified by the Texas Dietetic Association, the Texas Academy of Family Physicians and Texas A&M University (Texas Beef Council, 1999).

HEREDITY OR ENVIRONMENT, OR BOTH, AS DIET/NUTRITION/HEALTH CONSIDERATIONS: Lachance (1994) reviewed all of the pertinent literature and concluded that "By exploiting results from current research on the role of genetic inheritance in individual susceptibility to obesity, and new findings on the mechanisms of body fat gain, advancements in human obesity treatment may be possible, including (1) screening for genetic predisposition, particularly in the case of a family history of obesity; (2) measuring fat-free mass; (3) recommending diets with specifically altered chemical compositions; (4) tailoring exercise regimens and changes in life-style habits; (5) prescribing specific drug interventions when clinically necessary.

Dodd (1997) reported that: (a) The varying needs of people have always made mass diet prescriptions scientifically, culturally and sociologically incorrect; yet, when it comes to dietary advice, especially in the area of chronic disease prevention and intervention, much guidance continues to be all-inclusive. (b) Some health professionals continue to arm patients who have elevated serum cholesterol levels with lists of high- and low-cholesterol foods, ignoring the role of such factors as total dietary fat, lifestyle and genetics. (c) Mass diet prescriptions and lists of food to, or not to, eat have the tendency to encourage people to follow advice that is either unnecessary or inappropriate for them, to seek alternative solutions or to ignore the problem. (d) An emphasis on genetics can help food and nutrition professionals provide dietary advice tailored to individual's needs (Dodd, 1997). Genetics determines susceptibility to disease but whether or not a predisposed individual develops the disease may depend on environmental factors such as nutrition (National Dairy Council, 1995). The book "Genetic Nutrition:Designing A Diet Based On Your Family Medical History," by Simopoulos *et al.* (1993) discusses ways to evaluate diet/nutrition/health, and particularly which foods to eat and enjoy vs. avoid in the context of specific risks for development of diseases to which one might be genetically predisposed.

Simopoulos *et al*. (1995) concluded that coronary artery disease, hypertension, diabetes, cancer and other chronic diseases in adults tend to aggregate in families, but families share both genes and environment; the food industry has a unique opportunity and responsibility to develop specific products for the prevention and management of chronic diseases. Simopulos (1997) reviewed the scientific literature on the subject of diet and gene interactions and concluded that universal dietary recommendations have been used by nutritionists who were concerned with undernutrition; but universal dietary recommendations are not appropriate when the problem is overnutrition or prevention

of chronic diseases. Individual dietary recommendations taking into consideration genetic predisposition and energy expenditure should be targeted to individual's needs (Simopoulos, 1997).

Salvage (1995) said that "During the past few years, red meat has been singled out as a dietary villain by some physicians treating patients with high blood cholesterol levels; drastically cutting or totally eliminating red meat from the diet was often prescribed for high blood cholesterol cases." But, according to Cindy Schweitzer (Director of Meat Science/Research Information for the National Live Stock and Meat Board) "Dietary cholesterol is not the only factor, nor is it the major factor; we now know that genetics play a major role in a person's blood cholesterol level" (Salvage, 1995).

The March 1997 Issue of Food Technology contained five papers from a symposium entitled "Impact of Diet and Genetic Interactions on Chronic Disease Risk" that was sponsored by the Institute of Food Technologists Nutrition Division. That symposium provided background information that will influence the changes in dietary recommendations that began with the 1969 White House Conference on Food, Nutrition and Health. Knowledge about the interactions between genetics and diet has been growing rapidly since the National Institutes of Health began funding the Human Genome Project in the mid-1980s (Food Technology, 1997). Understanding that genetics plays an important role in chronic disease has changed the role of diet in dealing with those diseases and has opened the door to recommendations for foods for use in preventing or managing specific health conditions (Food Technology, 1997). Included in the symposium were five papers, dealing with: (a) diet and gene interactions (Simopoulos, 1997); (b) diet, genetics and obesity (Foreyt and Poston II, 1997); (c) diet, genetics and lactose intolerance (Suarez and Savaiano, 1997); (d) diet, genetics and diabetes (Atkinson, 1997), and; (e) incorporating genetics into dietary guidance (Dodd, 1997).

Simopoulos (1997) concludes that: (1) Universal dietary recommendations have been used by nutritionists who were concerned with undernutrition; but universal dietary recommendations are not appropriate when the problem is overnutrition or prevention of chronic diseases. (2) Individual dietary recommendations taking into consideration genetic predisposition and energy expenditure should be targeted to individual's needs. (3) Since genetic variants are expressed in a specific environment, populations should not copy each others' recommendations; furthermore, because of genetic variability, families and subgroups within a population have different susceptibilities to chronic diseases. (4) The early identification of the individual at risk for chronic disease and appropriate treatment with nutritional or pharmaceutical means should lead to prevention, amelioration or delay in disease manifestation. (5) The general recommendation to lower saturated fat and cholesterol ignores other important aspects of diet known to influence lipid levels, fibrinogen levels and blood vessel wall interactions that are affected by a balance of omega-6 and omega-3 essential fatty acids; furthermore, it is essential that energy intake balances energy expenditure, since saturated fats are formed in the body from excessive calorie intake. (6) The food industry has a unique opportunity and responsibility to develop specific products for the prevention and management of chronic diseases (Simopoulos, 1997).

The rate at which our knowledge of relationships between genes and diseases is increasing exponentially. Genetic Engineering News (1999a) included an article describing a gene, that can be identified by use of a gene marker, which is an interleukin–1 (IL-1) that is associated with atherosclerosis of the coronary artery. Medical Sciences Systems, Inc. (San Antonio, TX) is using the IL-1 gene marker to determine a person's genetic susceptibility to coronary heart disease. Stenosis

(occlusion of arteries) is treated with balloon angioplasty, which opens up the artery; however, in approximately 30% of the patients, the artery occludes again through ingrowth of smooth muscle cells (Genetic Engineering News, 1999b). Studies on porcine coronary arteries show that delivery (gene transfer) of the gene Adeno NOS to the tissue at the same time as balloon angioplasty can significantly reduce the ingrowth of these smooth muscle cells. Most diseases, though, are caused by combinations of high-frequency genes which individually carry relatively low increases in risk; in the Oxagen, Inc. "common disease model," frequency and class of specific genes are considered to identify the extent to which a person is at risk to the disease (Genetic Engineering News, 1999c).

Three researchers reported (in *Nature Genetics*) the discovery of the gene responsible for a cellular pump that transports HDL cholesterol out of cells and into the arteries (Wall Street Journal, 1999). The ABC 1 gene was tracked down by analyzing DNA samples from families with Tangier Disease. Mutations in the ABC 1 gene disable the biological pump trapping HDL cholesterol inside cells, which take on a distinctive orange hue. The relationship was first noticed when a young boy, on a Chesapeake Bay island, had orange tonsils; sleuth work led to the fact that high concentrations of HDL cholesterol inside cells caused tonsils to appear orange. Wall Street Journal (1999) cited Dr. Bryan Brewer (National Institutes of Health) as saying "Someday, drugs capable of switching the pump on-and-off may halt progression of atherosclerosis and dismantle atherosclerotic plaques." It is also conceivable, though, that the gene controlling the cellular pump may be identified, making possible the use of gene markers to find people with defective pumps and/or use of gene transfer for therapeutic applications.

Suppose we knew all of the genes involved in cardiovascular health—which ones contribute to risk, which contribute to protection and how much each contributes individually and in combination (Agricultural Research, 1999a). M.D. Jose Ordovas (USDA Human Nutrition Research Center on Aging at Tufts) is working on that; researchers want to be able to reduce a person's likelihood of cardiovascular disease based on his/her genetic profile, as well as on the individual's age, gender, and lifestyle habits. A genetic profile would enable individuals to adopt the habits most likely to reduce risk, because different genes or gene combinations respond differently to changes in diet, exercise, smoking, alcohol consumption, or medications such as cholesterol-lowering drugs (Agricultural Research, 1999a). "The trouble is," says Dr. Ordovas "people respond differently to lifestyle changes or to medication; for instance, reducing total fat and saturated fat in the diet doesn't necessarily improve people's blood lipids equally—if at all—because of small differences in their genes. The appropriateness of one-size-fits-all public health recommendations is being seriously questioned because there are associations between genes that regulate blood lipids and lifestyle" (Agricultural Research, 1999a).

SUMMARY AND CONCLUSION: Comparisons of percentages of supermarket shoppers with nutritional-content concerns reveal that--from 1990 to 1999 (TRENDS—1990 vs. TRENDS—1999)—fears about cholesterol declined by 25 percentage-points (44% vs. 19%), about calories declined by 11 percentage-points (19% vs. 8%) and about vitamins/ minerals in foods declined by 12 percentage-points (14% vs. 2%). Percentages of people who vigorously exercise declined sharply in 1992 based on data for sales of exercise videotapes, demand for jogging shoes and shorts, and memberships in health clubs (Howard Probst, 1992). In part, such declines are the result of a change in attitudes (people no longer believe that there is a "magic bullet"--something they can do, not do, avoid

or take--that will cause them to "live forever"). Part of the cause of the growing ambivalence of U.S. citizens about health and longevity relates to: (a) Changing opinions of the medical community about dietary factors (e.g., cholesterol, fatty acids) and about genetics vs. environment in causation of disease, and (b) Belief that the practice of "balance, variety and moderation" in the entire life-style is the key to both "enjoying" and "extending" one's life. Browner (1990) reported that the increase in human life-span that could be expected if percentage of calories from fat declined from the present 37%, to the targeted level of 30%, would be, on average, 3 to 4 months--rather than dying, on average at 79.2 years of age, people who complied with the calories-from-fat guidelines could expect to live to the ripe old age of 79.5 years. Obviously, people will eat some foods for reasons other than nourishment, health or longevity. The June 1994 Issue of Parade magazine included an article entitled "What People Like To Cook For A Romantic Dinner"; steak ranked first for 35.7% of respondents while shrimp (7.0%), lobster (6.7%) and pasta (5.3%) ranked second, third and fourth (Parade, 1994).

USA Today (1998) reported that people in the USA now live a record 76.1 years. Among other findings were: (a) Deaths from the leading killers have dropped; heart disease continued its decline, down 12% from 1990 to1996, and deaths from cancer dropped by 5%, halting its steady climb for the first time. (b) Education lengthens life and enhances health; less-educated adults have higher death rates for all major causes of death, including chronic diseases, infectious diseases and injuries. (c) Education also governs smoking habits; between 1994 and 1995, cigarette smoking declined overall among adults 25 and over but the declines were greatest among the best educated (USA Today, 1998). USA TODAY (2000a) reported projected life expectancy for American men and women born in these years as: (a) 74 and 80 years for men and women, respectively, born in 1999, (b) 78 and 84 years for men and women, respectively, born in 2025, and (c) 81 and 87 years for men and women, respectively, born in 2050.

The Ten Most Popular, Supper Main Dishes in 1990 (Balzer, 1999) were: (1) Spaghetti, (2) Steak, (3) Soup, (4) Fresh Baked Chicken, (5) Pizza, (6) Hamburger, (7) Pork Chops, (8) Fresh Seafood, (9) Salad, and (10) Fresh Fried Chicken. In 1998, the list reads; (1) Pizza, (2) Spaghetti, (3) Soup, (4) Fresh Baked Chicken, (5) Steak, (6) Hamburger, (7) Pork Chops, (8) Salad, (9) Fresh Seafood, and (10) Frozen Entrée (the only new entry). Balzer (1999) interprets this to mean that: (a) The single most important thing about our diet is familiarity, (b) Emphasis in diet/health/nutrition is changing (less concern about fat, calories, cholesterol; more concern about taste); Americans are attempting to improve their health by use of vitamins and nutraceuticals, (c) When changes in the U.S. diet occur they are due to growing population segments in new lifestages (e.g., empty-nesters), price, time-savings or fads/fun ("new" experiences). Balzer (1999) says it all boils down to the consumer saying: (1) Save me money, (2) Save me time, and/or (3) Make the "old" (familiar products) "new."

Balzer (2000) reported that: (a) The number of meals prepared and eaten at home (N=917) is at an all-time low; meals at restaurants (N=139) are at an all-time high. (b) Of the 14% increase in restaurant meals in the decade of the '90s, fast-food restaurants captured 80% of that growth. (c) Heat-and-eat meals are becoming increasingly popular; in 1999, 34% of all home-cooked meals included at least one item where preparation was just "warmed" or "heated." (d) Consumers are more concerned with their time and money than with maintaining a balanced diet. (e) After years of attempting to eat our way to

better health, with the only tangible result being a heavier American, we are looking for the easiest and cheapest way of feeding ourselves.

REFERENCES

Agricultural Research. 1999a. Attaching heart disease at its genetic base. ARS-USDA (July Issue) pages 20-21.

Agricultural Research. 1999b. Fats ratio crucial to lowering cholesterol. (May Issue) page 22.

Allred, J.B. 1995. Too much of a good thing? An overemphasis on eating low-fat foods may be contributing to the alarming increase in overweight among U.S. adults. J. American Dietetic Assn. 95:417-418.

American Heart Association. 1989. Low-Fat, Low-Cholesterol Cookbook:An Essential Guide For Those Concerned About Their Cholesterol Levels. Random House Publishers, Inc. New York, NY.

American Heart Association. 1990. The Healthy American Diet. American Heart Association, Dallas, TX.

American Institute for Cancer Research. 1999. A healthy weight for life: Healthy living and lower cancer risk. American Institute for Cancer Research, Washington, DC.

American Institute for Cancer Research. 2000. Getting active, staying active: How to enjoy a more physically active life. American Institute for Cancer Research, Washington, DC.

Angus News. 1997. Industry gives dietitians ways to reconsider beef. (August 25, 1997 Issue) Section B, page 20.

Atkinson, M. 1997. Diet, genetics and diabetes. Food Technology 51(3):77-79.

Balzer, H. 1999. National Eating Trends report and the CREST study. Proc. Reciprocal Meat Conference. American Meat Science Association, Kansas City, MO.

Balzer, H. 2000. We're turning more to cheaper. Associated Press (Denver Post, January 20 Issue) page 12.

Beef. 1998a. A critical eye on consumers: Meals not meats. (June Issue) pages 6-8.

Beef. 1998b. Go Ahead; Beef up your diet. (September Issue) pages 64-66.

Beef. 1999a. Beef is smart food. (June Issue) page 38.

Beef. 1999b. Comparison of nutrient content of beef with other food choices. (April Issue) page 72.

Beef. 1999c. Ever feel hungry a few hours after a big meal? (July Issue) page 14.

Beef Business Bulletin. 1999. What link. (July 30 Issue) page 3.

Berry, D. 2000. CLA--The milkfat wonder. Dairy Foods (February Issue) pp. 33-34.

Bonanome, A. and Grundy, S.M. 1988. Effect of dietary stearic acid on plasma cholesterol and lipoprotein levels. New England Journal of Medicine 318:1244.

Brasher, P. 2000. Rules to set standards for organic foods. Associated Press. (Denver Post, March 5 Issue) page 53.

Briscoe, D. 2000. World's overweight population catches up with underfed. Associated Press (Denver Post; March 5 Issue) page 1.

Browner, J.I. 1990. Effect of lowering dietary calories-from-fat on longevity of human subjects. Proceedings of the Conference On Cost and Health Implications of Cholesterol Lowering. (September 17-20, 1990) National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD.

Buege, D.R. 1990. A Nationwide Survey Of The Composition And Marketing Of Pork Products At Retail. University of Wisconsin, Madison, WI.

Byers, T., D. Ahnen and S. Prindiville. 1997. Colorectal cancer: Myths, facts and possibilities. pp. 8-9. American Council of Science and Health, Inc., New York, NY.

California Beef Council. 2000. Why beef? California Beef Council, Pleasanton, CA.

Cattle•Fax. 1995. Report to the National Cattlemen's Beef Association Analyzing USDA (1994) Data. Cattle•Fax, Inc., Englewood, CO.

Chon, G. 1997. Study finds youths not eating healthy. The Coloradoan (September 3, 1997) page B-4.

Courtland Journal. 1995. Good health means healthy diet for all. Courtland Journal (May 4, 1995 Issue) Courtland KS.

Dodd, J.L. 1997. Incorporating genetics into dietary guidance. Food Technology 51:80-82.

Food Chemical News. 2000. Dietary guidelines advisory committee: Proposed revisions to the federal dietary guidelines (February 14 Issue) pages 32-38.

Food Marketing Institute. 1983. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1983. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1986. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1986. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1987. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1987. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1988. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1988. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1989. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1989. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1990. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1990. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1991. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1991. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1992. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1992. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1993. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1993. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1994. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1994. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1995. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1995. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1996. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1996. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1997. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1997. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1998. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1998. Food Marketing Institute, Washington, DC.

Food Marketing Institute. 1999. TRENDS IN THE UNITED STATES--Consumer Attitudes & The Supermarket 1999. Food Marketing Institute, Washington, DC.

Food Processing. 1999a. Market Link 1998 Shopper Survey. (May 1999 Issue) page 34.

Food Processing. 1999b. It's a natural. (June 1999 Issue) page 16.

Food Processing. 1999c. The battle for healthy living. (April Issue) page 42.

Food Technology. 1997. Impact of diet and genetic interactions on chronic disease risk. (March Issue) page 65.

Food Technology. 1999. Food consumption, prices and expenditures—1970 to 1997. 53(6):30 (June 1999) from Putnam and Allshouse, ERS Statistical Bulletin 965.

Foreyt, J.P. and W.S.C. Poston II. 1997. Diet, genetics and obesity. Food Technology. 51(3):70-73.

Genetic Engineering News. 1999a. New gene marker for coronary disease. (March 15 Issue) page 37.

Genetic Engineering News. 1999b. Coronary Restenosis: Balloon angioplasty plus gene transfer. (June 15 Issue) page 11-37.

Genetic Engineering News. 1999c. Oxagen's common disease model; Genotype, risk and events. (June 15 Issue) pages 19-21.

Grundy, S.M. 1986. Comparisons of monounsaturated fatty acids and carbohydrates for lowering plasma cholesterol. New England Journal of Medicine 314:745.

Health and Human Services. 1985. National Institutes of Health Consensus Development Conference: Health Implications Of Obesity. U.S. Department of Health and Human Services, Washington, DC.

Health and Human Services. 1988. The Surgeon General's Report on Nutrition and Health. U.S. Department of Health and Human Services, Washington, DC.

Hellmich, N. 1999. Foodmaster Somers: Eat fat, lose weight. USA TODAY (June 22, 1999 Issue) page 8D.

Hellmich, N. 2000. Heart Association revising diet guidelines. USA TODAY (The Coloradoan, March 15 Issue) page B-6.

Hollingsworth, P. 1997. Mainstreaming healthy foods. Food Technology 51(3):55-58.

Humphries, Jr., C.H. 1997. The importance of quality grades for pork and beef in domestic and export markets. Proc. Reciprocal Meat Conference. American Meat Science Association, Kansas City, MO.

Lachance, Paul. 1994. Human Obesity:Scientific Status Summary. Food Technology (February 1994 Issue) pages 127-138.

Lands, W.E.M. 1999. Balancing fatty acids. Food Technology 53(1):120.

Ledall, G. 2000. Beef still booming. Beef Business Bulletin 23(11):3.

Littman, M. 1998. Separating fat from fiction. Prepared Foods (January 1998 Issue) pages 29-34.

Mattson, F.M. and Grundy, S.M. 1985. Comparison of effects of dietary saturated, monounsaturated and polyunsaturated fatty acids on plasma lipids and lipoproteins in man. Journal of Lipid Research 26:194.

McBean, L.D. 1997. Red meat and cancer: A review of current epidemiological findings. National Cattlemen's Beef Association, Chicago, IL.

Meat & Poultry. 1998. AHA certification. (June Issue) page 62.

Modern Maturity. 1998. The canons of losing weight. (May/June Issue) pages 38-39.

Montana Beef Council. 1999. Some C.L.A. today, may keep the doctor away. Western Livestock Journal (June 28 Issue) page 7.

National Cattlemen's Beef Association. 1996. Compliments Of Beef: Many Key Vitamins And Minerals Can Be Found In One Three-Ounce Serving Of Beef. National Cattlemen's Beef Association, Englewood, CO.

National Cattlemen. 1997. The skinny on lean beef. (Citing data for chicken from USDA Handbook 8-5, 1979 and data for beef from USDA Handbook 8-13, 1990). September Issue, page 38. National Cattlemen's Beef Association, Englewood, CO.

National Cattlemen. 1997. The skinny on lean beef. (September Issue) pages 24-26.

National Cholesterol Education Program. 1988. Report Of The Expert Panel On Detection, Evaluation And Treatment Of High Blood Cholesterol In Adults. Archives Of Internal Medicine 148:36.

National Dairy Council. 1995. Genetics and nutrition:New discoveries. National Dairy Council, Dairy Council Digest 66:19-24.

National Eating Trends. 1997. Point change in annual eatings per capita, 1996 vs. 1987. National Eating Trends (NET), NPD Group, Inc., New York, NY.

National Live Stock and Meat Board. 1991. Exploring Meat and Health. National Live Stock and Meat Board, Chicago, IL.

National Live Stock and Meat Board. 1994. Eating In America Today. A Dietary Pattern and Intake Report Commissioned by the National Live Stock and Meat Board, Chicago, IL.

Neff, J. 1998. Fat city for fat research: Focus on fats and oils turns from how much to what kind. *Food Processing*. (February Issue) pages 31-32.

New Product News. 1999. New-product introduction in North America in 1998. (April Issue) page 27.

Nutrition Action Newsletter. 1995. Work Sheets To Estimate Risks Of Heart Disease. Center for Science in the Public Interest, Health and Fitness News. Washington, DC.

Nutrition Action Newsletter. 1999. 10 Foods You Should Never Eat; 10 Super Foods You Should Eat. (July Issue) Center for Science in the Public Interest, pages 1-2.

OmegaTech. 1998. Reducing risk factors for CHD: Focus on triglycerides and long-chain omega-3 PUFA. (December Issue) OmegaTech, Inc., Boulder, CO. pages 1-2.

Parade. 1994. What people like to cook for a romantic dinner. Parade (June 1994 Issue) page 22.

Phelps, Anthony. 1992. Selective Research Overstates Fat Link to Heart Disease. Feedstuffs (August 17 Issue) page 16.

Pork '98. 1998a. Pork: The heart-healthy meat. (February Issue) page 55.

Pork '98. 1998b. The skinny on pork's fat content. (February Issue) page 56.

Pork '98. 1998c. Meat can pump you up. (February Issue) page 46.

Pork '99. 1999. CLA offers farm-to-fork gains. (April Issue) page 28.

Prepared Foods. 1999a. Changes from 1996 through 1998 in food products bearing nutritional claims. (April Issue) pages 27-30.

Prepared Foods. 1999b. 15 ballpark bets; Top 15 food trends for 1999-2000 (April Issue) pages 52-55.

Prepared Foods 1999c. Preparing family meals and eating together. (May Issue) pages 12-14.

Quarterly Research Update. 1998. Diet high in meat protein may lead to weight loss and improved blood lipids. National Cattlemen's Beef Association (July/September Issue) page 4.

Render. 1998. Beef may aid in preventing adult diabetes. (October Issue) page 12.

Rocky Mountain News. 1997. Good diet key to preventing cancer. Rocky Mountain News: Patricia Reaney of Reuters byline. (September 26 Issue) page 13.

Ross, E. 1999. Fish oil supplements can cut risk of heart-related death. Associated Press. (In: The Coloradoan, August 6 Issue, page B6).

Savell, J.W., H.R. Cross, D.S. Hale and L. Beasley. 1988. National Beef Market Basket Survey. Meat Research Brief. Meats and Muscle Biology Section, Texas Agricultural Experiment Station. Texas A&M University, College Station, TX.

Salvage, Bryan. 1995. At The Heart Of The Lipids Issue. Meat Marketing & Technology (August Issue) page 94.

Saurez, F.L. and D.A. Savaiano. 1997. Diet, genetics and lactose intolerance. Food Technology 51(3):74-76.

Schmid, R.E. 1999. Sweet, sour of food labels: Added sugar not revealed. Associated Press. (In: The Denver Post. August 4 Issue. page 11A).

Simopoulos, A.P. 1997. Diet and gene interactions. Food Technology 51(3):66-69.

Simopoulos, A.P., V. Herbert and B. Jacobson. 1993. "Genetic Nutrition: Designing A Diet Based On Your Family Medical History." MacMillan Publishing Company, New York, NY.

Simopoulos, A.P., V. Herbert and B. Jacobson. 1995. "The Healing Diet." MacMillan Publishing Company, New York, NY.

Sloan, A.E. 2000. Fortification frenzy: The new wellness mindset. Food Technology 54:20.

Smith, G.C. 1990. Can the red-meat industry accommodate dietary intervention strategies? Proceedings of the Conference On Cost and Health Implications of Cholesterol Lowering. (September 17-20, 1990) National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD.

Smith, G.C. and J.B. Morgan. 1999. Understanding today's customers and marketing to their needs; Industry trends and projections for the future; Current and future food safety issues—Staying ahead (1998-1999). Wakefern Food Corporation Seminar, Edison, NJ (September 14-15, 1999).

Sofos, J.N., E. Harmayani and G.C. Smith. 1995. Cholesterol:Health Effects and Potential For Reduction. Nutrition Abstracts and Reviews 65(6):533-539.

Texas Beef Council. 1999. A nutrition innovation. National Cattlemen. (April/May Issue) page 6.

The Coloradoan. 1995. How we die. The Coloradoan (May 2 Issue) Fort Collins, CO.

The Gallup Organization. 1989. Eating For Better Health. A Gallup Survey for the International Food Information Council and The American Dietetic Association. The Gallup Organization, Princeton, NJ.

The Gallup Organization. 1993. A Survey Of Diet And Nutrition Issues Among Health Professionals. The Gallup Organization, Princeton, NJ.

Union Leader. 1995. The most recent word concerning fats comes from the American Council on Science and Health. Union Leader (May 24 Issue) Manchester, NH.

USA TODAY. 1992. Ten Leading Causes Of Death In The USA. (October 2 Issue) page L-1.

USA TODAY. 1998. Prosper and live longer, to 76.1. (July 30 Issue) page 16.

USA TODAY. 1999. Focus on nutrition and exercise in battle against cancer. (January 11 Issue) page 20.

USA TODAY. 1999. "Fatty" Mediterranean diet cuts heart attack risk. (February 16 Issue) page L-1.

USA TODAY. 2000a. Longer lives ahead. (February 18 issue) page 1.

USA TODAY. 2000b. Other food favorites. (February 16 Issue) page 24.

USDA. 1990. USDA Handbook 8-13. United States Department of Agriculture, Washington, DC.

USDA. 1996. The New Beef: Beef Has 27% Less Fat Than Ten Years Ago. Southwest Meat Association Newsletter (April Issue) page 3. (Citing data from USDA Agricultural Handbook 8-13).

USDA/USDHHS. 1992. The Food Guide Pyramid booklet. Leaflet No. 572. U.S. Department of Agriculture, Human Nutrition Information Service (August 1992). Washington, DC.

USDA/USDHHS. 1995. Nutrition And Your Health: Dietary Guidelines For Americans. Fourth Edition. U.S. Department of Agriculture and U.S. Department of Health and Human Services, Washington, DC.

Virginia Cattlemen. 1999. USDA-ARS Food Intake Survey—1998, Nationwide measurement of the kinds and amounts of food eaten by U.S. citizens (May Issue) page 17.

Vitamin Cottage Health Hotline. 1999a. Leading causes of death in U.S. (1994). (July 3 Issue) page 6.

Vitamin Cottage Health Hotline. 1999b. Food Hotline: The animal protein we eat. (July 3 Issue) page 4.

Wadden, T.A. and Stunkard, A.J. 1993. Psychosocial consequences of obesity and dieting. In "Obesity:Theory and Therapy." Second Edition. Raven Press, Ltd. New York, NY.

Waldsmith, L. 1999. Healthful fast-food options exist. Detroit News. (In: The Coloradoan. August 7 Issue). page D-8.

Woman's Day. 1999. The inside scoop on what Americans eat. (February 16 Issue) page 52.

Wood, S. 1999. Beef: It's even better than you thought. National Cattlemen. (August Issue). page 10.

Young, L.R. and M. Nestle. 1995. Portion sizes in dietary assessment: Issues and policy implications. Nutrition Reviews 53:149-158.

Young, M., D. Hayes and K. Maki. 1999. New research shows lean red meat can be part of a heart disease risk-reduction diet. Proc. Cattlemen's College: Consumer Demand Strategies—Meeting The Challenge. pages 18-25.