

Literature Review of Consumer Research, Publications, and Marketing Communications Related To Pasture-Raised Animal Products and Production Systems

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Context

This review was prepared specifically to lay the groundwork for consumer message development for pasture-raised animal products. The review focuses on market research and publications from the past ten years.

Introduction

The increase in pasture-raised meat, poultry and dairy production arises both from a market push and a market pull. Farmers with a certain set of values have expressed a preference for pastured production systems over animal confinement systems, providing the market push. They find that these systems fit better into their overall farm management plans. Consumers with a certain set of values have expressed a preference for animal products that result from a pastured system, providing a market pull. (Wheatley 2001) Members of both groups see pasture systems as an alternative to the rise of industrial animal confinement systems, referred to in the popular press as “factory farming.” (Halverson 1987)

Traits that have been identified as appealing by consumers in general include:

- Food safety (*lack of* hormones, antibiotics)
- Humane (better treatment of animals)
- Environmental (better management of waste, protection of natural resources)
- Enhanced nutrients (increased conjugated linoleic acids, higher nutrient content)
- Social (support small farms)

This will be covered in detail in the “Consumer” section.

Pasture-raised is a broad term that encompasses a number of production systems used by farmers. Some terms and practices are more common to particular species; such as “free-range,” a common term for poultry, and “grass-based,” a common for beef and dairy products. Often the terms are used to distinguish these practices from the common industrial practice for that species; in the case of poultry, “caged” or “confined” and in the case of beef and dairy, “grain-fed.” Attributes such as organic or locally grown may or may not be combined with pasture-raised. This will be covered in more detail in the “Production” section.

Consumer

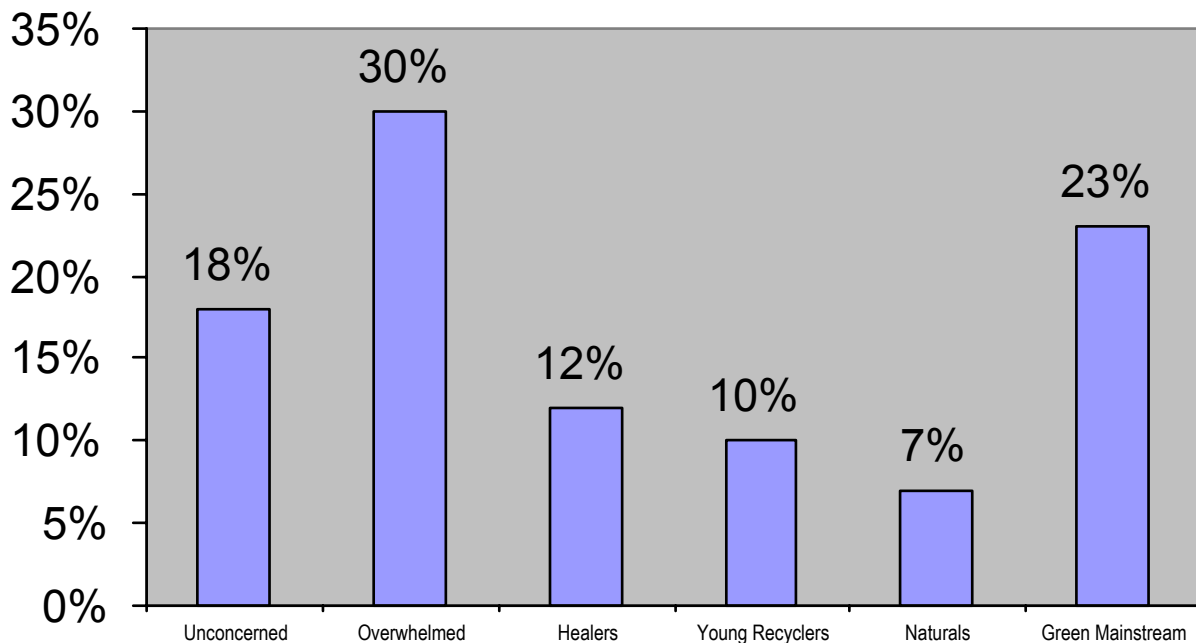
International Studies

Erikson et al. (1998) conducted a comparative study of product characteristics that determine decisions regarding purchasing of beef in the United States, Japan and Australia. They found that the least important consideration for U.S. and Australian consumers was knowing where the meat was produced, which significantly differed from the Japanese results. This finding in turn impacts dietary considerations in eating beef.

U. S. “Green” Consumer Studies

Several market studies conducted in recent years have described a sector of the market comprising 25 percent of the U.S. adult population (between 40-50 million Americans) whose purchasing decisions are increasingly guided by their social and environmental values (Harwood 1995). This market sector is known as the “New Green Mainstream” (Hartman 1996) or the “Cultural Creatives” (Ray 1996).

In 1996, The Food Alliance sponsored nationwide consumer survey of 2,900 households to determine the extent to which consumers would support small family farmers and practitioners of sustainable agriculture. The Hartman Group published the research presenting overwhelming evidence that American consumers want to support sustainable farmers. Of the consumers surveyed, a 52 percent of the population indicated a willingness to support sustainably-produced products if the choice is available to them. Consumers can be categorized broadly as follows:



According to the Hartman Reports, about 7 percent of the population, called the “True Naturals,” is already strongly committed to environmentalism and to organic foods. These shoppers are regular consumers of organic products, are willing to pay premiums for organic and earth-sustainable products, and will refuse to buy over-packaged products. The New Green Mainstream is 23 percent of the population, and represents the greatest opportunity for market expansion of organic and earth-sustainable products. They are increasingly curious about environmentalism, and are concerned about chemical pesticides and fertilizers, but they remain resistant to paying premiums for environmentally sound products. People in this segment are not actively seeking information, but are more likely than the average person to have purchased a sustainable product or visited a health food store/supermarket in the past month. Availability remains one of the key barriers to increased purchasing of organic products for this group. Although this segment mirrors the total population demographically, one notable difference is their tendency to be more concerned about social and environmental issues, and a tendency to stand up for the things in which they believe.

The Affluent Healers (12 percent of population) are higher-income, better educated people often employed in managerial positions. The Hartman Group identifies this group as a “secondary target” for environmentally sound products. Because they have a tremendous amount of disposable income, they present a great opportunity in terms of buying power. They want to help the environment, but it is not one of their top concerns. Nutrition, health, and wellbeing are more important to this segment; they will be more likely to buy sustainable products if they think that these items have added nutritional value. Young Recyclers, 10 percent of the population, also were identified as a “secondary target” for environmentally sound products. This group cares about environmental issues in a broad sense, but is less interested in issues specifically relating to the food supply, and consequently has limited interest in organic or earth-sustainable foods. Even though they claim that they look for products that are made with recycled materials, they are no more likely than the total population to refuse to buy products that are over-packaged or to have bought or expressed interest in buying a sustainable product. Also, while declaring concern about nutrition, they have not necessarily modified their diets and prefer cooking foods that require little preparation.

The last two segments comprise about 48 percent of the population. The Overwhelmed make up the largest segment of the population (30 percent) and the Unconcerned make up the third largest (18 percent). Both groups display a general apathy toward life, have little interest in food preparation or nutrition, and are likely to buy canned or frozen vegetables. They do not like to cook, are not very concerned about nutrition, and do not try to modify their diets. Not surprisingly, both of these groups tend to take a commodity approach to groceries, purchasing the least expensive brand. Furthermore, neither group is concerned about the environment or about judicious use or renewal of resources. Both of these categories offer little potential for purchase of sustainable products.

A “New” Segment--The LOHAS Consumer, or “Cultural Creatives”

While the Hartman Group used demographics to break down segments of the population, others suggest that *values*, rather than demographics, should be the basis for consumer differences.

According to the anthropologist and sociologist Paul Ray, Ph.D., a major paradigm shift is

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Appendix A

occurring in American values—one that is about maintaining lifestyles that are more environmentally and spiritually sustainable (Ray 1996, 1997). Along with this shift come new types of consumers—consumers who want to integrate their purchases with strong concerns about human rights, fair trade, the environment, sustainable practices, and spiritual and personal development. Identified as the LOHAS (lifestyles of health and sustainability) segment by Natural Business Communications, these people are currently the focus of more and more marketers in the business community dealing with “natural” products and services (Emerich 2000).

Who are the LOHAS consumers? This group also is often referred to as the “Cultural Creatives.” They are the “leading edge” thinkers and creators of a new culture in America and the most influential opinion leaders. Issues they are most concerned about include ecological sustainability, women’s issues, peace, social justice, and “planetary awareness.”

According to Ray, the Cultural Creatives, or LOHAS, segment includes 50 million persons or 26 percent of American adults (roughly equal to the combination of the Hartman Group’s New Green Mainstream and True Naturals). Of the three major cultural groups that Ray identified, he claims that Cultural Creatives are the fastest growing—they moved from less than 4 percent of the population in the 1960s to 23.6 percent in 1995 and more than 26 percent in 1999. Interestingly, even though they represent a significant portion of the population, studies show that many Cultural Creatives feel under-represented and misunderstood by media, leaders, and institutions. Moreover, they feel that they are isolated in their values, and often do not express their opinions outside of their most closely knit groups. As a result, many industry leaders may view the marketplace for sustainable products as being much smaller than it really is (Nachman-Hunt, 2000, Ray, 2000).

Demographics do not define the Cultural Creatives. Their incomes are just about average, and their median income was \$53,000 in 1999. They are slightly more educated than most, but they include all age groups except those over 70. Their median age is 42. They live all over the country and are no more liberal or conservative than other Americans. One demographic, however, sticks out. Women outnumber men in this segment—60 percent are women and 40 percent are men. This may be why the cultural creative segment seems to be highly concerned about bringing women’s values into the public arena (Nachman-Hunt 2000, Ray 2000).

Ray provides several tips for selling to Cultural Creatives. He stresses focusing on *relationships* first and foremost rather than “treating the customer like a walking wallet.” This means doing everything possible to provide the best information about products and the best service. It also means taking time to talk to customers and getting to know them. Cultural Creatives care about *authenticity* and are turned off by manipulative sales pitches. As far as images and advertising, whole process and systems thinking are key. Cultural Creatives like stories that weave together and connect the different values and issues they care about. Further, they want stories about real people and the “big picture.” In other words, they want to know where a product came from, how it was made, who made it, and what happens when they’re done with it. Slick ads that ignore ecological implications won’t work--Ray suggests that symbols on products “go deep” (Nachman-Hunt 2000, Ray 2000).

Cultural Creatives exhibit distinct “lifestyle markers.” They are very literate, and buy a lot of art, music, books and magazines. They watch less TV and listen to more radio than average. Flash and fad will not sell products to them—they want goods and services that offer social, cultural, and psychological depth. They like food a lot; they like to talk about it, eat out, and cook gourmet and ethnic foods. Because they care about health, “healthy and natural” products should cross over with gourmet and ethnic foods (Nachman-Hunt 2000, Ray 2000).

Ray’s work indicates that a significant cultural shift could eventually occur as Cultural Creatives coalesce into a community that can exert its collective power on the social, economic, and political arenas.

Midwest

The demographics reported in the Hartman and Ray reports formed the basis for a number of other market studies and reports, such as the “Overview of Natural Foods Market in Iowa (Cooperative Development Services 1999). In this report, the four primary demographic characteristics used to describe natural food shoppers (age, education, household income and occupation) were compared to the demographics of Iowa’s five Metropolitan Statistical Areas (MSAs). The MSAs were then ranked according to their propensity to buy natural foods as predicted by demographics. (In order from highest to lowest: Cedar Rapids/Iowa City, Des Moines/Ames, Davenport, Dubuque, and Waterloo/Cedar Falls).

The University of Nebraska Food Processing Center recently published a study that focused on locally grown food products. The survey was administered to 500 randomly selected households in Iowa and Nebraska. These consumers identified “taste” as the most important attribute, with “quality”, “nutritious and healthy” and price ranked as very to extremely important. “Organic” and “local store brand” were the least important attributes rated by these consumers. For these consumers, the top-rated attributes (extremely important or very important) when purchasing meat products were “food safety (95 percent)”, “quality (97 percent)”, “USDA inspection (92 percent)”, “tenderness (96 percent)” and “juiciness (93 percent)”.

Three attributes that had a slightly below average rating are important to note. Two-thirds of the respondents said that it is very or extremely important that meat is raised in a humane way. The fact that the meat they purchased is “locally grown (69 percent)” or “from a small family farm (65 percent)” ranked very or extremely important to those respective households

The lowest ranked attributes were “pastured (48 percent)”, “all-natural (52 percent)”, “grass-fed (40 percent)”, free-range (36 percent)” and “organic (36 percent)”. This study noted that although only 11 percent of consumers had heard of the term “pastured poultry”, 48 percent said that the attribute “pastured” is very or extremely important, suggesting the term “pastured” may be an important term for use in marketing the product.

The University of Nebraska study also looked at the rating of attributes for meat products by residence (urban, suburban, rural, and state). Comparing rural with urban/suburban consumer responses, the study showed that the attributes of taste, locally grown, raised in a humane way,

from small family farm, pastured, all-natural, grass fed, free-range and organic are all more important in rural areas than they are in urban/suburban areas. The attribute “ease of preparation” was significantly more important in urban/suburban areas (89/92 percent) than in rural areas (78 percent).

The University of Minnesota recently published a study that examined factors associated with consumer purchases of sustainably produced foods. The study surveyed 550 consumers in urban and suburban grocery stores in the St. Paul, Minnesota, metropolitan area in October and December 2000. One of the key findings is the high ranking that consumers gave to environmental concerns and their interest in identifying environmentally-friendly products at retail when asked how important certain attributes are in their purchase decision. After the attributes of taste, freshness, safe, and healthy, consumers ranked the following attributes as important or very important:

- “foods produced with practices to protect water quality (89 percent)”
- “protecting soil quality (87 percent)”, and
- “foods produced with practices designed to maintain/improve natural resources (85 percent)”.

The attribute “foods produced organically” received a significantly lower ranking with 60 percent of consumers considering it important or very important.

FoodRoutes Network recently concluded a research survey of 1,600 shoppers in four markets — Greater Philadelphia Metro region, PA; Santa Cruz County, CA; Black Hawk County, IA; and Baton Rouge, LA. The survey findings corroborated many of the findings in the studies cited above. The FoodRoutes study showed that consumers’ top attributes when purchasing food products are:

- freshness (87 percent very important)
- nutritional value (67 percent very important)
- cost (59 percent very important) and
- chemical or pesticide free (57 percent very important).

The study also showed that terms such as “pasture raised”, “organic”, or “grass fed” either made no difference or consumers were not sure if it made any difference when purchasing meat products.

Clearly there is a very big challenge in communicating and educating consumers about the features and benefits of “pasture-raised” or “grass-fed” meat products. The studies show that consumers have a very low awareness and understanding of these terms. It will be critical to make much stronger linkages between the terms used to describe production practices and consumer concerns for health, food safety, environmental protection, local/family farms and animal welfare.

Market Research for Environmentally-Friendly Meat Production Systems

Hog producers can develop niche markets for their pork by emphasizing the animal welfare benefits or environmentally friendly aspects of their systems. A survey of Colorado, Utah and New Mexico grocery shoppers determined that many— especially high-income, frequent consumers of pork and those concerned about growth hormones and antibiotic use—are willing to pay a premium. “These target consumers are very concerned about the production practices utilized by the producers,” write Jennifer Grannis and Dawn Thilmany of Colorado State University, who surveyed 2,200 shoppers and analyzed 1,400 responses in 1999. “A highly visible and descriptive label that highlights production practices must be part of the packaging.”

Research funded by the Leopold Center at Ames, Iowa, found that consumers would pay nearly \$1 more for a package of pork chops labeled as produced under an environmentally friendly alternative system. (The study defined the “most environmentally raised pork product” as being produced in a way those results in 80 to 90 percent odor abatement and 40 to 50 percent reduction in surface water pollution.) The study by Iowa State University economics professor James Kliebenstein surveyed randomly selected consumers in four diverse market areas. Of those, 62 percent said they would pay a premium for pork raised with such a guarantee. (Hurley and Kliebenstein 1999)

To gauge potential for pasture-raised pork in Arkansas, the Arkansas Land and Farm Development Corporation (ALFDC) worked with the University of Arkansas, with partial funding from SARE, to conduct market research into consumer perceptions and preferences. Almost 70 percent of respondents to a 1998 questionnaire sent to 1,200 consumers and 42 supermarkets and restaurants in the Delta region indicated a preference for “environmentally friendly” pork products over conventional. More than 73 percent identified pasture-raised pork as natural and healthy, and 65 percent of retailers preferred to sell local, organically grown meat if available at premium prices. (Armah and Kennedy 1998).

In West Virginia, Cacapon Institute investigated the potential of marketing beef raised in a “river-friendly” manner to people with a vested interest in clean water – primarily riverfront property owners. Beef that was raised in a “river-friendly” rotational grazing system was pooled and marketed through a targeted direct mail campaign. A survey was conducted of the first 60 Petite Beef customers. In answer to the question, “What element of the program is most important to you?” six “elements” were identified as important by 100 percent of the respondents (33 respondents). These elements were:

- No added hormones and antibiotics (17 percent identified as most important)
- Grass fed (0 percent identified as most important)
- Promote sustainable farming practices (26 percent identified as most important)
- Help support local, family farms (26 percent identified as most important)
- River friendly (22 percent identified as most important)
- Preserve open spaces (4 percent identified as most important)

Low fat was identified as a positive element by 92 percent and 91 percent felt that the price reflected the quality and environmental benefits of the product. Ninety-one percent indicated that they would re-order.

Grannis and Thilmany (1999) found consumers were willing to pay a premium for natural ham and pork chops. Thirty-nine percent of the sample were willing to pay a 9 percent premium for natural ham and 29 percent were willing to pay a 10 percent premium for natural pork chops, with decreasing percentages willing to pay up to a 46 percent premium. Armah and Kennedy (2000) found that urban dwellers, individuals with greater than a high school education and families with incomes over \$50,000 all were more likely to pay a premium for pasture-raised pork. High-income, frequent consumers of pork who also have purchased natural beef are the most likely to purchase and pay premiums for pasture-raised pork.

The McGuirk, Preston and McCormick (1990) study found that a consumer segment identified as “highly concerned with food safety” was very likely to pay significant (not quantified) premiums for “natural” pork, without additives, preservatives, nitrates, pesticide residues, antibiotics or hormones. Kinsey, Senauer and Jonk (1993) found that 11 percent of consumers were concerned about chemicals in meat, 52 percent were concerned about general “food safety” and only 19 percent were primarily concerned with price in the Minneapolis/St. Paul area.

Consumer Priorities for Meat Attributes (In order of importance)

Kinsey, Senauer, and Jonk	Grannis and Thilmany
No Growth Hormones	Not Treated with Chemical Preservatives
No Antibiotics	No Growth Hormones
Grazing Managed to Protect Streams	No Antibiotics
Grazing Managed to Protect Endangered Species	Animals fed organic feeds
No small or crowded pens	
Grass-fed animals	
Meat aged at least 14 days	
Animal born and raised within 250 miles	

Wheatley, 2001

Market Research for Health Benefits of Grass-Fed Animal Products

A Wisconsin study (Greenberg and Klasna 2002) evaluated the possibilities of marketing cheese with high conjugated linoleic acid (CLA) contents from grass-fed animals. The study included a review of secondary data on CLA and human health; interviews with experts conducting research on CLA for human applications; interviews with key cheese buyers in retail and wholesale; and an analysis of the opportunities, constraints, and general recommendations and implications for marketing cheese with CLA. Researchers identified the following constraints to marketing and the potential opportunities that may exist.

Constraints

- No actual health claims can be made about CLA for humans at this time.
- CLA is not known by most cheese buyers.

- Market demand for CLA in foods is limited.
- A consistent supply is important for certain buyers.

Opportunities

- The market for specialty cheese in the U.S. is increasing.
- There are market opportunities for organic cheese at natural foods co-ops.
- Local/regional, farmer-owned products are attractive at natural foods cooperatives.
- A product labeled “no hormones, no antibiotics” is marketable at natural foods co-ops.
- Omega 3s offers a good market opportunity.

Conclusions from the study include:

- Specialty cheese sells primarily on taste.
- Use caution in making statements about CLA.
- An education campaign will be essential if the marketing strategy selected is focused on CLA.
- “Grass-fed” and “local” or “regional” labels are currently easier for consumers to understand than “farmstead.”
- A conflict of interest may exist among scientists attempting to demonstrate health claims for CLA when they are the same people who hold patents for CLA products.

The authors’ recommendations to marketers are:

- “Market your advantages”. Emphasize characteristics that are readily marketable: excellent taste, Midwest source, grass-fed produced and produced by small family farmers.
- Keep price competitive
- Do not market solely on health characteristics. Product demonstrations are the most important marketing tools. Since taste is the primary characteristic that sells cheese, demos are the best opportunity to allow consumers to sample and compare it to other products.

Animal Production Systems

Each species has a number of terms and informal criteria for pastured systems.

Poultry Production Models

There are several production models in use for both meat and egg-laying birds. The different models allow for varying levels of forage in the poultry diets. Based on the amount of grain and protein mix consumed by these birds, growers estimate that not more than 25 percent of the diet in any of these systems is likely to be composed of forages and insects. Egg-laying birds may consume a greater portion of their diet by foraging than poultry raised for meat. These production systems are applicable for chickens, ducks, geese, and turkeys.

- **Pastured**
Poultry are raised in moveable pens with 1.25 to 2 square feet of space allowed per bird. Pens are moved at least once daily to fresh pasture. Forage (depending on quality and composition) can constitute from 20 to 25 percent of the diet. Key elements of a pasture poultry enterprise include:
 - chickens are raised in moveable pens that are moved at least daily to ensure the birds have continuous access to fresh pasture,
 - chickens receive exercise and fresh air while foraging for plants and insects,
 - manure is distributed evenly through the pasture, and
 - chickens usually fed a non-medicated feed or natural feeds.

- **Free-range**
Chickens may be raised in a confinement facility, but are given the opportunity for free ranging. There is no industry standard for the number of square feet per chicken, either in the enclosed housing or in the ranging area, so the meaning of ‘free-range’ varies from operation to operation. Outside range areas ideally contain growing plants, but where buildings are permanently fixed, heavy animal use in the associated ranging areas may kill the vegetation.

- **Day-range**
This production system is a variation on the free-range model. Chickens, whether broilers or laying hens, are confined in a building at night for protection from predators, but have full access to range with live plants during the day. The buildings used for nighttime housing are portable and are usually moved to fresh pasture several times during a growing season.

- **Organic**
Poultry are raised on feed that contains no added chemicals or medication. For chicken to be certified as organic:
 - the organic production process must begin with day-old chicks,
 - the feed must be certified as organic, meaning the feed processor must be certified,
 - chickens must be allowed access to sunshine and fresh air,
 - the ground the chickens are raised on must be certified as organic, and
 - the birds must be processed in Federal slaughter plants that are certified organic.

Beef Production

The beef production cycle begins with the cow and calf, most of which are raised on pasture throughout the United States. At four to six months of age and weights ranging from 400 to 650 lbs., calves are weaned from their mothers and enter a second production phase. At this stage, they may be raised further on pasture or enter a feedlot and begin eating a largely grain-based diet. In the south central and southeastern United States, a majority of calves continue to graze on pasture to weights of 750 to 850 lbs. At this weight, they then are placed in feedlots and fed to reach their market weights of 1100 to 1300 lbs. In the western and Midwestern United States, many calves go directly from weaning into feedlots for finishing. The term ‘grass-fed’ or ‘grass-finished’ is used for market beef animals, both steers and heifers, which complete their growth on pasture. Some producers supplement this forage diet with small amounts of grain fed out in the pasture, but the diet is predominantly forage. The number of days that a beef animal must be on a strictly or predominantly pasture diet for the meat to be classified as grass-fed has not been quantified.

Cows and bulls spend the majority of their lives eating predominantly pasture forage and hay. Their meat is largely marketed as ground beef, which may also be classified as ‘grass-fed.’

Dairy Production

The term ‘grass-fed’ or ‘grass-based’ for dairy production usually refers to herds that derive the majority of their feed on pasture during the growing season. Managers usually use a version of management intensive grazing (MIG) to achieve the production and quality goals desired for their milk products. Typically, animals are moved to fresh pasture twice daily during the growing season. The amount of supplemental, stored feed provided to dairy cows on pasture ranges widely from farm to farm. Cows may receive 5 to 20 lbs. of grain per head per day to increase milk yields. Grain may be fed on the pasture, but is more commonly fed in the milking parlor twice daily. Few grass-based dairies in the upper Midwestern United States do *not* provide supplemental grain during the grazing season. The amount of stored feed in the diet influences milk fat and fatty acid composition. (Dhiman et al. 1999)

The majority of grass-based dairies produce milk all year and must feed stored feeds—silage, hay and grains—during the months when pasture is not available. Milk composition during this time of year differs from that produced when cow are consuming predominantly fresh forage. **(Same reference as above)?**

Pork Production

Alternative pork production systems allow a range of access to pasture for breeding, gestating, and growing animals. Few commercially-raised pigs derive a majority of their feed from pasture. The pork production cycle is divided into several management periods.

1. Females may spend the breeding and gestating period of the production cycle on pasture, if the time period falls in the spring, summer, or fall. In the upper Midwest, most females are provided housing during the coldest months of the year. They may or may not be provided bedding during that time.

2. Farrowing may be on pasture during fair weather or inside on deep bedding. Bedded farrowing systems also usually do not include the use of farrowing crates, but allow gilts and sows to interact in social groups.
3. Pigs are weaned at weights ranging from 15 to 40 lbs. At this time, they may remain on pasture with a grain and protein mixed feed, provided free-choice out in the pasture, or they may be brought inside for the growing phase of production.
4. The growing and finishing phases of the production cycle are usually conducted with pigs under a roof. Deep-bedding in hoop structures is an effective and humane way to raise animals to market weights (230 to 270 lbs.). Few market pigs complete their life cycle completely on pasture.

Lamb Production

Farmers raising sheep conventionally concentrate lambing during January and February so that market lambs are available for a Passover/Easter market, a time at which lamb prices traditionally have been high. Farmers using pasture-based lamb production systems schedule lambing to coincide with the growth of pasture, so that ewes are outside and receiving adequate nutrition from pasture forages during lactation. Many farmers raise lamb out on pasture rather than inside, though this is dependent on weather, location, and personal preferences. Lambs are weaned at 30 to 50 lbs. and remain on pasture. To achieve adequate growth for lambs to reach market weights during the growing season, some form of management intensive grazing must be used. Lambs may or may not be supplemented with grain on pasture. Lambs are marketed at approximately 95 to 120 lbs. and later in the year than most conventionally-raised feedlot lambs. Ewes can obtain adequate nutrition for their production and maintenance needs entirely from pasture during the growing season and stored forages during the winter. Grain is not required.

Health Benefits of Products from Grass-fed Animals

There are a number of studies that link amounts of omega-3 fatty acids and conjugated fatty acid in the human diet with human health. In addition, the ratio for omega-3 and omega-6 fatty acids in the diet has been reported to influence several health factors. Polyunsaturated fatty acids, especially those from the omega-3 group, have a significant role in prevention of stress-induced diseases and those induced by improper diets. Findings from Western industrial countries show that longer (**greater? long-term?**) intake of linoleic acid (LA) (omega-6) with a relative “deficiency” of omega-3 is the main risk factor in the occurrence of cancer, coronary diseases, cerebro-vascular diseases and allergic hyperactivity. Milk and milk products have a protective effect against cancer. The potential anticancer agents include conjugated linoleic acid (Kralik et al. 2000). Beaulieu (2000) provides a literature summary of conjugated linoleic acids (CLA) found in meat and milk. References are cited on the effects of CLA in the diet, including anticarcinogenesis, including mammary cancer in rats; an alteration of fat partitioning in the body leading to increased lean and decreased adipose tissue deposition; decrease in atherosclerosis; normalization of glucose tolerance and enhanced immune status.

Simopoulos and Robinson (1998) present a thought-provoking analysis of some life-saving discoveries about diet and health. To introduce a change in the dietary makeup of our food, the authors present the *Omega Plan* that restores a healthy balance of essential nutrients. In

proposing the ‘Greek diet’ as a healthy alternative, the authors argue that people on a Greek diet had an unprecedented 76 percent lower risk of dying from heart disease.

Effects of grass-based/grazing diets on fatty acid levels and ratios in animal fats.

Beef and Lamb

Ruminant meat is a natural source of conjugated linoleic acid (CLA). Lamb is the richest meat source of CLA (Mulvihill 2001). Steers were fed on diets containing varying levels of forages for the last 85 days preceding slaughter. Diets ranged from 100 percent grazed forages to one composed mostly of grain concentrates with 1 kg. of hay provided per day. The concentration of polyunsaturated fatty acids in intramuscular fat was highest for the steers eating 100 percent grazed forages. Increasing the proportion of forages in the diet resulted in linear increases in the polyunsaturated fatty acid to saturated fatty acid ratio and the concentration of conjugated linoleic acid (CLA) in the intramuscular fat (French et al. 2000). Shantha et al. (1997) fed steers to market weights either on an all-pasture diet or pasture plus cracked corn for 150 days. The all-pasture group of animal had 1.5 times as much CLA in the top round muscle as did the group supplemented with grain.

Milk Products

Milk contains a number of components with anti cancer potential. The milk fat is associated with conjugated linoleic acid (CLA), which is a potent inhibitor of mammary tumorigenesis and perhaps has a role in prostate cancer therapy (Parodi 2001). Fresh forage diets, which are rich in polyunsaturated fatty acids, are among the factors responsible for increasing the CLA level in dairy products. The use of raw milk, which is a source of environmental microorganisms, the use of lamb or kid rennet paste in cheese production, which is rich in lipolytic enzymes, and high-temperature treatments also play an important role (Prandini et al. 2001). Milk fat from pasture fed cows seems to be higher in linoleic acid than milk fat from cows receiving preserved grass or maize, but the magnitude of this difference is limited. Feeding ensiled feed, even grass silage compared with fresh grass, decreases the concentrations of mono- and polyunsaturated fatty acids, including conjugated linoleic acid, in the milk fat (Smedman and Vessby 2001). Others also have documented the decrease in CLA content of milk for dairy cows when fed more stored forages and supplemental grains compared with fresh pasture diets (Jahreis et al. 1997; Precht and Molmenti 1997; Stanton et al. 1997).

Poultry Products

Two genetic lines of broilers were reared indoors during the first half of the production cycle. During the second half of their growth period, half were reared indoors and half outdoors. Chickens finished outdoors had a more favorable fatty acid composition than those reared indoors: both the share of essential fatty acids (linoleic a., a-linoleic a.) as well as the concentration of polyunsaturated omega-3 and omega-6 fatty acids was greater. (Rogelj 2000) A recent study funded by the USDA. Sustainable Agriculture and Research Education Program (SARE) reported that free-range chickens had 21 percent less total fat, 30 percent less saturated fat, and 28 percent fewer calories. The breast meat was so lean that the U.S.D.A. could classify it as "fat free." Yet the meat had 50 percent more vitamin A and 100 percent more omega-3 fatty acids. The SARE study also compared eggs from free-range chickens with eggs from caged birds. Eggs from free-ranging hens had 10 percent less fat, 40 percent more vitamin A, and 400

percent more omega-3 fatty acids. An unexpected finding was that, in addition, the eggs from free-range chickens had 34 percent less cholesterol. (Gorski 2000) For eggs from free-ranging hens, Lopez-Bote et al. (1998) found up to 20 times as much omega-3 fatty acid as in eggs from hens in conventional buildings and feeding programs.

References

- Armah, Paul W. and Donald Kennedy. 1998. Identification of Market Potential for Pasture-Raised Pork in the Mississippi Delta of Arkansas – 1998. *Journal of Food Distribution Research*, Vol. 31, No. 1, March 2000, 89-97
- Beaulieu, A. Denise. 2000. Grazing and CLA in milk and meat. What is CLA and why do we care? Proceedings of the 2000 Great Lakes International Grazing Conference. Available online at:
http://www.msue.msu.edu/jackson/Dairy/Grazing/2000/Proceedings/32_Grazing_and_CLA_in_milk_and_meat.htm
- Cooperative Development Services. 1999. Overview of Natural Foods Market in Iowa. Iowa State University Extension, 100 EES Building, Ames, IA. May 1999.
- Dhiman, T. R., G. R. Anand et al. (1999). Conjugated linoleic acid content of milk from cows fed different diets. *J Dairy Science* 82(10): 2146-56.
- Erikson, Glade R., Thomas I. Wahl, Raymond A. Jassaume and Hongqi Shi. 1998. Product Characteristics Affecting Consumers' Fresh Beef Cut Purchasing Decisions in the United States, Japan and Australia. *Journal of Food Distribution Research* Vol. 31, No. 3, November 1998, 16-25.
- French, P., C. Stanton, F. Lawless, E.G. O'Riordan, F.J. Monahan, P.J. Caffrey and A.P. Moloney. 2000. Fatty acid composition, including conjugated linoleic acid, of intramuscular fat from steers offered grazed grass, grass silage, or concentrate-based diets. *J. An. Sci.* 78(11): 2849-55.
- Gillies, Neil. 2001. Petite Beef by Headwater Farms: Marketing Beef Using a Land Stewardship and Clean Water Label. Presented at the Missouri Forage and Grassland Council 2001 Annual Conference. November 2001.
- Gorski, B. 2000. Pastured Poultry Products. Final Project Report, SARE Project FNE99-248. Northeast SARE, U. of Vt., Hills Bldg., Burlington, VT 05405-0082. Summary available online at: http://www.sare.org/projects/san_db_viewer.asp?id=1474.
- Grannis J. and D.D. Thilmany, 1999. Marketing Natural Pork: An Empirical Analysis of Mountain Region Consumers, Selected Paper, American Agricultural Economics Association (AAEA) Annual Meetings, Nashville, TN, 1999.
- Greenberg, Laurie S. Z. and Darcy Klasna. 2002. The Marketing Potential of Conjugated Linoleic Acid (CLA) in Cheese. Report for the Wisconsin Initiative for Value-Added Development, Sustainable Agriculture Research and Education (SARE) Program and The North Central Initiative for Small Farm Profitability: Initiative for Future

Agriculture and Food Systems (IFAFS) Program. Available online at:
<http://www.farmprofitability.org/research/cla/index.htm>

Halvorsen, D. ed. 1987. *Factory Farming: The Experiment that Failed*. Animal Welfare Institute, P.O. Box 3650, Washington, D.C. 20027 or www.awionline.org.

Hartman Group, The. 1996. *The Hartman Report. Food and the Environment: A Consumer's Perspective, Phase I*. Bellevue, Washington: The Hartman Group 1621 114th Ave. SE, #105 Bellevue, WA 98004

Harwood Group, The. 1995. *Yearning for Balance: Views of Americans on Consumption, Materialism and the Environment*. Bethesda, Maryland: The Harwood Group. Report available from: Merck Family Fund at 6930 Carroll Avenue, Suite 500, Takoma Park, Maryland 20912.

Hurley, S.P. and J.B. Kliebenstein. A Look at Consumer Willingness to Pay for Pork Products with Environmental Qualities. *1999 Swine Research Report*, Iowa State University, ASL R1675. Available online at: <http://www.exnet.iastate.edu/ipic/reports/99swinereports/asl1675.pdf>

Jahreis, G., J. Fritsche and H. Steinhart. 1997. Conjugated linoleic acid in milk fat: High variation depending on production system. *Nutr. Res.* 17:1479-84.

Kinsey, J., B. Senauer, and Y. Jonk, Desirable Attributes for Value Added Meat Products Survey – 1993, Center for International Food and Agricultural Policy, Working Paper WP 93-7, November 1993.

Kralik, G., J.L. Havrenek, A. Petricevic, and I. Juric. 2000. Animal products in nutrition of human population. *Stocarstvo*. 54(4): 261-71.

Lopez-Bote, C. J., R. Sanz Arias, A.I. Rey, A. Castano, B. Isabel and J. Thos. (1998). Effect of free-range feeding on omega-3 fatty acids and alpha-tocopherol content and oxidative stability of eggs. *Animal Feed Science and Technology* 72: 33-40.

McGuirk, Preston, and McCormick, 1990. Toward the Development of Marketing Strategies for Food Safety Attributes, *Agribusiness*, 1990; Vol. 6, No. 4, pp. 297-308.

Mulvihill, B. 2001. Ruminant meats as a source of conjugated linoleic acid (CLA). *Nutrition-Bulletin* 26(4): 295-9.

Parodi, P.W. 2001. Cow's milk components with anti-cancer potential. Proceedings Farm to Fork 2001, Melbourne, Australia, 18-20, 2001. *Aust. J. Dairy Tech.* 56(2) 65-73.

Prandini, A., D. Geromin, F. Conti, F. Masoero, A. Piva and G. Piva. 2001. Survey on the levels of conjugated linoleic acid in dairy products. *Italian J. Food Sci.* 13(2): 243-53.

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and Marketing Communications Related To
Animal Products and Production Systems

Appendix A

- Precht, D. and J. Molkenin. 1997. Effect of feeding on conjugated cis-9, trans-11-octadecadienoic acid and other isomers of linoleic acid in bovine milk fats. *Nahrung* 41:330-5.
- Ray, Paul H. 1997. The Emerging Culture. *American Demographics* February 1997 19:28-34, 36.
- Ray, Paul H. and Sherry Ruth Anderson. 2000. *The Cultural Creatives: How 50 Million People Are Changing the World*, New York: Harmony Books.
- Robinson, Ramona, and Chery Smith. February 2001. Promotion of sustainably produced foods: Customer response in Minnesota grocery stores. *American Journal of Alternative Agriculture* Volume 17, Number 2, 2002, 96-104.
- Rogelj, I. 2000. Fatty acid composition of poultry meat from free range rearing. In *Animal products and human health: Proceedings of the 8th International Symposium Animal Science Days*. University of Osijek, Osijek, Croatia, 20-22 September 2002. *Professional Reviews* 6(1): 53-6.
- Shantha, N.C., W.G. Moody and Z. Tabeidi. 1997. Conjugated linoleic acid concentration in semimembranosus muscle of grass- and grain-fed and zeranol-implanted beef cattle. *J. Muscle Foods* 8:105-10.
- Smedman, A. and B. Vessby. 2001. Conjugated linoleic acid supplementation in humans—metabolic effects. *Lipids* 36(8): 773-81.
- Stanton, C., F. Lawless, G. Kjellmer, D. Harrington, B. Devery, J.F. Connolly and J. Murphy. 1997. Dietary influences on bovine milk cis-9, trans-11-conjugated linoleic acid content. *J. Food Sci.* 62:1083-6.
- Wheatley, W. Parker. 2001. *Consumer Preferences, Premiums, and the Market for Natural and Organic Pork: Locating a Niche for Small-scale Producers*. University of Minnesota, The Swine Center. February 2001.

Additional references not cited:

- Cook, M.E. and M. Pariza. 1998. The role of conjugated linoleic acid (CLA) in health. *International Dairy Journal* 8:459-62.
- Enser, M., N.D. Scollan, N.J. Choi, E. Kurt, K. Hallett and J.D. Wood. 1999. Effect of dietary lipid on the content of conjugated linoleic acid (CLA) in beef muscle. *Animal Science* 69:143-6.

Ip, C. 1994. Conjugated Linoleic Acid. A powerful anticarcinogen from animal fat sources. *Cancer* 74:1050-4.

Schupp, Alvin, Jeffrey Gillespie and Debra Reed. 1998. Consumer Awareness and Use of Nutrition Labels on Packaged Fresh Meats: A Pilot Study. *Journal of Food and Distribution Research* Vol. 29, No. 2, July 1998, 24-30.