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Understanding food labels

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Abstract

Have you ever made a purchase based on a food label? Everyone gives food labels a cursory glance, but for the many consumers who wish to make purchasing decisions that reflect their personal and social values, food labels are critical. How do you decipher the myriad of new symbols, logos, certification claims, and sometimes meaningless information presented in today's marketplace? How do you know which labels contain statements that are not regulated by governmental agencies? Can you differentiate third-party certifications from private company claims? In this commentary, we categorize and review a broad array of new label varieties, claims, certifications, and regulations. We then describe a new online, interactive resource for consumers to help them improve their understanding of food labels. Finally, we inventory additional teaching tools and resources that may provide educators with other food label curricula for consumers.

Keywords

Consumers, Food Labels, Government-regulated Labels, Third-party Labels, Understanding of Food Labels

Introduction

Consumers rely on the information presented on food labels to make purchasing decisions that reflect their personal and social values (Wartella, Lichtenstein, Yaktine, & Nathan, 2012). Being able to decipher the information presented on food labels is an important part of making purchasing decisions. All commercially processed food items have a label that includes the product name, weight, manufacturer's address, nutrition facts, and list of ingredients. However, many labels contain

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additional statements may not be regulated. For these reasons, it can be difficult to discern what labels mean and what content is regulated or not. This commentary describes a new resource for consumers to improve their understanding of food labels. The elements of food labels commonly used by government or certifying third-party agencies were cataloged, identifying the standards for their use. Common label claims generated by producers were also cataloged with their legal definition. Additional teaching tools and resources were inventoried to provide educators with food label curricula for consumers. Lastly, it shares an interactive website that allows consumers to explore various food labels and their standards, as well as view short informational videos about food industry standards regarding labeling.

Background: Food Labels

The Food and Drugs Act of 1906 focused mainly on stopping manufacturers from producing and selling adulterated or misbranded foods. At that time, labels frequently would be worded correctly under the law but also have deceptive pictures that led to erroneous perceptions by the consumer (United States Bureau of Chemistry, 1922). Although there have been many new laws and regulations created regarding food labels, manufacturer compliance and consumer comprehension of these regulations remains problematic.

Consumers, food manufacturers, third-party entities, and the government all play an integral role in determining the contents of food labels (Golan, Kuchler, Mitchell, Greene, & Jessup, 2001). Consumers are the driving force for market labels; they use their purchasing power to influence not only what is on the market but also how products are marketed. Manufacturers are knowledgeable about which labels resonate with consumers and thus can result in premium prices (Golan et al., 2001). Third-party entities serve as regulators for specific food attributes. When producers meet the standards set by third-parties and undergo the certification process, they can use specific food labels like "organic" or "non-genetically modified organisms" ("non-GMO"). The government also influences food labels to encourage consumer safety and health, increase consumer access to information, and promote fair competition between producers (Golan et al., 2001; Van Loo, Caputo, Nayga, Meullenet, & Ricke, 2011).

Although consumers are a driving force for market labels, their influence does not always translate into an understanding of the food label terminology. Studies have shown that in most cases, consumers purchase organic food because they believe it to be more sustainable, socially responsible, and supportive of small farms (Lessing, 2011). However, the organic label is, in fact, relaying information regarding pesticide use, livestock feed, pasturing, and restrictions on certain processes like genetic engineering (Lessing, 2011). The term "organic," as defined by the U.S. Department of Agriculture (USDA), may not be perceived by consumers the same way it is defined by the USDA. There have been several studies conducted in the U.S. showing that consumers are willing to pay a premium of 10–25% more for organic foods because they believe them to be of higher quality (Caputo et al., 2011). Even though consumers are unable to discern physical differences between organic and conventional food they are willing to pay a premium for a product with an organic label.

Studies indicate that many consumers misunderstand food labels' intended meaning. This confusion calls for supplemental education to help consumers understand the label claims (Shepard, 2014). Studies have also shown that consumers are unsure of whom to trust. In a study by Janssen and Hamm (2012), they revealed more trust in third-party organic certifiers than producers and processors. They also showed skepticism about the integrity of organic products, which discouraged them from buying more organic food (Janssen & Hamm, 2012). On the other hand, consumer perceptions and attitudes regarding organic food labeling can be altered through awareness of organic standards and certification logos (Janssen & Hamm, 2012).

If consumers are unable to understand the information a food label presents, it is not serving its intended purpose. Through education, consumers can better understand the information presented on food labels and then use food labels to make more informed purchasing decisions (Heimbach & Stokes, 1982). The present project

provides consumers the opportunity to become more informed about the food they are purchasing. Although there are other resources available, most focus on only one aspect of a food label. Consumers are therefore tasked with navigating numerous websites and resources to find basic food label information. Many of these sources focus on only one category or part of the food label, leaving consumers unaware of other label information. Current consumer education efforts are mainly focused on the nutrition label but often neglect to address other aspects of the label. There appears to be no single source that can provide consumers with an overview of all the categories of food labels and provide unbiased information about the standards dictating the use of specific labels. An all-inclusive resource for consumers and educators is needed to help improve consumers' overall understanding of food labels.

Overview of Food Labels

Food labels are a cost-effective way of communicating information about a product to consumers (Miller & Cassady, 2015). The U.S. Food and Drug Administration (FDA) mandates that all food labels have five components (The National Food Lab, 2013). The package must have a principal display panel (PDP) and an information panel (IP). The PDP should be the first component a consumer sees when examining a product. It must include the product identity that accurately describes the product as well as a net contents statement that provides the quantity of the product. Nutrition facts, ingredients, an allergen statement, and a signature line are contained on the IP, which is located to the right of the PDP. Federal Code 21 details acceptable scenarios for nutrition facts (21 U.S.C. § 101, 2008). The ingredients must be listed in descending order by weight (21 U.S.C. § 101, 2008). If the product contains any allergen (milk, eggs, fish, crustacean shellfish, tree nuts, peanuts, wheat, or soybeans), an additional allergen statement must be included (21 U.S.C. § 101, 2008). The last required component is a signature line, which includes the name and address of the responsible party (21 U.S.C. § 101, 2008). However, most packages contain additional information, including product seals, certifications, and information about how and where the product was made. The FDA and USDA regulate some claims to protect consumer interest by prohibiting false and misleading food labels (Negowetti, 2013). Despite this, many terms used by manufacturers to elicit consumer favor are not regulated.

There are three possible origins for food label claims: government certified, third-party certified, and producer claim. Labels, seals, or certifications issued by the federal government have been inspected or guaranteed by trained inspectors or auditors. Third-party certifications can originate from consumer demands, and hold manufacturers to specific growing, environmental, processing, and/or handling standards in order to label their product with a branded claim. The last type of claim seen on packaging is that of the producer. Although by law these claims must not be false or misleading, they are defined by the producer and are not held to a standard definition.

Government labels

There are three main reasons the government is involved with food labels: (1) to ensure fair competition among producers, (2) to provide consumers with basic product information, and (3) to reduce health and safety risks of consumers (Golan et al., 2001). Two federal government agencies, the FDA and USDA, help ensure that food products are safe, wholesome, sanitary, and properly labeled (U.S. FDA, n.d.).

Current USDA seals, certifications, and labels were created by the USDA's Agricultural Marketing Service (USDA AMS) to guarantee the quality of American food products and add value to those products (USDA, 2017). The USDA uses these labels for dairy products, fruits, vegetables, specialty crops, organic agricultural products, poultry, eggs, beef, other livestock, and products approved by laboratory testing(USDA AMS, 2017b).

One of the newest labels is the USDA Organic Seal. Organic food products can be placed into three categories: 100 Percent Organic, Organic, and "Made With" Organic. Each of these categories has its own requirements with which farms and businesses must comply in order to label and market their products as organic (USDA AMS, 2017b). According to the USDA:

> Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation. Before a product can be labeled 'organic,' a Government-approved certifier inspects the farm where the food is grown to ensure the farmer is following all the rules necessary to meet USDA organic standards. (Gold, 2007)

Country of Origin Labeling (COOL) is a USDA requirement that certain food items must be labeled with information regarding the source for muscle cut and ground meats (lamb, goat, venison, and chicken); wild and farm-raised fish and shellfish; fresh and frozen fruits and vegetables; peanuts, pecans, and macadamia nuts; and ginseng (USDA AMS, 2017a). The COOL requirement is different from the previously mentioned government-regulated labels because there is not a standard label. The retailers are simply required to identify the country of origin, which could mean a package label, stamp, handwritten indication, or simply a visible sign on the product display.

Third-party labels

In addition to government-regulated claims, third-party organizations have taken it upon themselves to develop their own labels. Third-party labels can enhance the intelligibility and credibility of certain food attributes through the use of standards, verification, certification, and enforcement (Golan et al., 2001). Some of the more common third-party labels include American Grassfed®, Non-GMO Project Verified, Fair Trade Certified, Certified Angus Beef®, and Rainforest Alliance. Each third-party organization has its own set of standards that producers must follow to use their trademark design. Most third-party organizations communicate these product standards to consumers through their website.

Unlike government-regulated labels, which are intended to protect consumers from false and misleading information, third-party organizations have their own motives. Each organization's motives are different; some include animal welfare, environmental issues, local economic impact, or religious, cultural, or marketing interests. These labels provide consumers with additional information about the product that can be used at the consumer's discretion. Third-party labels may not be government-issued; however, they do still need to comply with food labeling laws. This means that the label itself is subject to evaluation by the Labeling and Program Delivery Staff (LPDS), a subunit of Food Safety Inspection Service (FSIS). LPDS evaluates labels for religious-exempt products,[1] labels for export with deviations from domestic requirements, labels with special statements, and claims and labels for temporary approval.

Any label that does not fall into one of the previously listed categories may be generically approved without LPDS evaluation (USDA FSIS, 2017). A producer is required to keep records of all labels and approved sketches, as well as product formulations, processing procedures, and any additional documentation to support its label's claims (USDA FSIS, 2017).

Producer labels

Claims can also be made by the food manufacturer or producer. These claims do not have to go through a government or third-party auditing system. Instead, the producer must simply ensure that the claims are not false or misleading. Some statements require that the food product meet certain standards to be used, while others are unregulated. For example, the term "free-range" is defined by the USDA as "produced by hens housed in a building, room, or area that allows for unlimited access to food, water, and continuous access to the outdoors during their laying cycle. The outdoor area may be fenced and/or covered with netting-like material" (USDA, 2015). This means that if the producer chooses to use the term free-range on their poultry or egg product, they must be able to supply evidence that the USDA standards for this term were met. Terms that are unregulated include *natural, 100%, pure, all, made*

[1] Religious-exempt products are those that do not follow standard food processing procedures because of religious beliefs. Examples of these exemptions include poultry or meat processed in accordance with kosher, halal, Confucian or Buddhist laws.

with real fruit, made with whole grains, lightly sweetened, a good source of fiber, and *strengthens your immune system* (Silverglade & Heller, 2010). Deeming these terms unregulated means that producers can use these terms to help in their marketing strategy with little or no evidence to support them. For example, a producer of strawberry ice cream could use the claim "made with real fruit" even if the ice cream is made using artificial strawberry flavoring and a few pieces of real strawberries. These claims may be considered misleading, but they are not breaking government regulations regarding food labels (Silverglade & Heller, 2010).

Consumer Perception

Food labels serve as information guides to consumers, for "accurate, easy-to-read and scientifically valid nutrition and health information on food labels is an essential component of a comprehensive public health strategy to help consumers improve their diets and reduce their risk of diet-related diseases" (Silverglade & Heller, 2010, p. i). Not only do food labels provide health information, but they also provide insight into how the product was raised, processed, handled, and distributed. It is important to recognize the complexity of labeling decisions because the consumer population has diverse values and beliefs (Golan et al., 2001).

Although food labels are intended to provide consumers with additional information, several studies indicate that consumers lack an accurate understanding of their meaning. In a global study involving 11 countries that included the U.S., 96% of respondents were very interested in food and nutrition (Enough Movement, n.d.). But consumer comprehension of food labels and farming practices does not always align with purchasing habits. Out of the respondents, 80% look at labels and food claims before purchasing (Enough Movement, n.d.).

Consumers perceive the term "all-natural" as encompassing organic production practices; they typically have a more idealized view of organic farming than what is reality (Baker, 2015). Some of the common perceptions of products labeled "all-natural" are that there are no preservatives, no additives, no antibiotics, no hormones, no extra liquids in meat products, no phosphates, and no chemicals (Abrams, Meyers, & Irani, 2009). They also associate the term with small family farms with livestock raised outside. Although producers are supposed to qualify an "all-natural" claim, it is not strictly defined by the USDA as is the term "organic" (Abrams et al., 2009). Some pork producers have been using "all-natural" and qualifying it with a "no hormones" statement. This may create a perceived risk in the consumer's mind when compared with other pork products not labeled "all-natural" and "no hormones," but growth hormones are prohibited in all pork and poultry products in the U.S. (Abrams et al., 2009). Hence, these labels are used purely as a marketing tactic with producers benefiting from the lack of consumer understanding (Abrams et al., 2009). This can hurt conventional food markets if the term "all-natural" continues to be perceived as the safer food choice (Abrams et al., 2009).

Even clear, concise food labels cannot address the problem of imperfect information (Golan et al., 2001). Consumers have to make purchasing decisions based on their private, individually calculated costs and benefits, independently of externalities and social objectives (Golan et al., 2001). If consumers are unaware of a label's' purpose and meaning, it will be difficult for it to affect purchasing behavior (Golan et al., 2001). Consumers will continue to be confused about what food labels represent unless they have access to clear explanations of government regulations and food labeling standards.

A Case for Consumer Education

Consumers must become aware of what label information is verifiable and what is just part of the producer's marketing plan if they wish to use their purchasing power to have an influence on natural resources and the environment, personal health and quality of life, and ethical issues, as well as cultural and social aspects of the economy (Benn, 2002). Only an educated consumer can look past personal needs and consider the complete history of a product and production circumstances (Benn, 2002).

In Ohio, the Revised Code 3313.60 (2001) mandates that the high school health education

curriculum include teaching "the nutritive value of foods, including natural and organically produced foods, the relation of nutrition to health, and the use and effects of food additives." This often includes teaching students how to read the nutrition label on food packages. However, educational resources on labeling rarely address topics beyond nutrition facts. When looking for food label information resources, there are a number of government websites that explain the USDA and FDA's involvement with food labels, particularly nutrition labels. There are also several third-party organization websites that provide information specific to their label standards. Consumers who are interested in educating themselves must, therefore, do multiple searches and filter mainly nonscientific information regarding food labeling. Although there has been a push for more government involvement with food labels, the problem remains that consumers are uninformed as to what they mean.

Developing an Online Resource for Consumers and Food System Educators and Professionals

Based on the observed need outlined above, we undertook a project to inventory, catalog, and develop a new educational website, supporting facilitator guide, and evaluation tool that can be used by Extension or consumer educators as they teach nutrition and healthy lifestyle classes. This project was composed of three main steps.

Step 1: Catalog standards and key aspects of commonly used food labels.

This step was approached by dividing the search into three categories of labels: government issued, third-party issued, and producer issued. The government issued labels were identified using the USDA and FDA's websites: https://USDA.gov and https://www.FDA.gov. Some FDA and USDA sources also identified third-party issued labels, which were cataloged at that time. A similar search procedure was used for third-party labels except that the sources for information became much broader. Search engines such as Google and Google Scholar were used to identify third-party labels. Search terms such as "animal welfare food labels," "fair trade," "environmental protection food labels," "seafood labels," "certified gluten-free," "free range," and "grass fed." All these are terms that are commonly seen on food packages in a grocery store. The last category of labels, producer issued, are the same claims seen in both government and third-party issued labels. The difference is that the producer is personally guaranteeing the product without any external auditing process. Google was used to search for individual producers who were making the same claims as third-party organizations; therefore a very similar search terms list was used. The documentation for these labels was slightly different in that the claims "terms" were identified and cataloged rather than the company that issued them.

Three vital pieces of information were gathered from each food label: the trademarked logo, the standards for making that claim, and who was responsible for the regulation of that claim. All food labels gathered were cataloged based on issuing body and cited according to their organization.

Step 2: Inventory of food labeling educational tools and resources currently available.

The first step was to make personal contact with Ohio State University Extension family consumer science educators (since the project was based in Ohio) and ask if they had any knowledge of food label curricula. Next, we conducted a general internet search using Google to locate resources used in both formal and informal education settings to teach about food labels. Search terms included "food label curriculum," "consumer education on food labels," "food label lesson," "tools for food consumers," "understanding food label claims," "meat label curriculum," "organic vs. natural curriculum," "fair trade curriculum," and "environmental food curriculum." The following information was documented for each tool or resource: name, grade level, cost, focus areas and objectives, and where to access the curriculum.

Step 3: Development of a food label educational website for consumers, a supporting facilitator guide, and an evaluation tool for educators.

Development of the website. The food labels

that were cataloged were then used to develop an interactive website that consumers could search easily (https://bit.ly/understandingfoodlabels). These categories were determined based on the literature review of common consumer questions and areas of confusion. Categories included: allergen, animal welfare, colors, flavors, sweeteners, environmental, fair trade and fair labor, genetic modification, health claims, meat, other marketing claims, organic, references and other resources, and a label quiz.

Visual aids were created and used throughout the website to help illustrate various topics. Videos were produced as additional website content to elaborate on food labeling perceptions, explain meat labeling, and provide examples of how the Ohio Proud label is issued to producers. These videos are used to quickly engage the website user in an educational experience regarding specific food label topics.

As shown in Figure 1, the left menu lets the consumer navigate from one category to the next. The category selected is clearly labeled at the top of each page, followed by a description of the label category and then clickable logos that direct the consumer to that label's home website. Consumers can easily navigate the website by using the main menu, which is present on all subsequent pages.

Facilitator guide. The facilitator guide was developed to help educators who are interested in teaching a consumer audience about food labels, navigate the website mentioned above, and facilitate an educational program or workshop using its content. An optional slide presentation was developed to accompany the guide.

Evaluation tool. The final component was an evaluation for use by educators facilitating a food label educational workshop or lesson. The evaluation can be used to test participants' knowledge of food labels after completing a food label workshop or training. The evaluation was designed as a series of multiple-choice questions covering basic food labeling information presented on the web resource.

Peer-review process to refine materials. As an additional step, the materials developed were peer-reviewed by an agriculture and natural resource

Figure 1. Screenshot of the Animal Welfare Claims Page from the Web Resource

Extension educator, as well as by a high school agri-science teacher interested in using the materials in a classroom setting. They were asked to review the consumer website resource, facilitator guide, and evaluation. When reviewing the website resource, they were asked to play the role of a consumer looking for information on food labels they have previously encountered. Their comments and suggestions were then used to refine the developed resources to better serve consumers and equip facilitators teaching about food labels with a facilitator guide and an evaluation tool. After revisions were made, they were presented again to the peer reviewers to establish whether the adjustments improved any previously mentioned issues.

Conclusion

This commentary outlines several tools that can be used independently or together depending on the needs of the clientele and depth of information desired. The catalog of food labels is a reference guide to the basic standards associated with specific labels. It is an excellent starting point for educators to quickly locate information, and provides a source for each label to locate additional information. The inventory of food labeling tools and resources is also a quick source of information when looking for teaching material on a particular labeling topic. Educators can access these curricula at https://bit.ly/understandingfoodlabels.

The online resource has a broader audience, targeting any consumer who wishes to know more about food labeling. The website is not intended for consumers to learn about every food label produced, but rather to guide them to resources on labels they are interested in or have questions about. The website does not endorse any label and does not verify the processes used to issue individual product labels. It is important for consumers to know that they have the right to know the standards, verification process, and enforcement of any label, and that they can request this information from the issuing party.

Strategies for facilitators using the catalog, inventory of tools and resources, facilitator guide, and evaluation include creating a custom workshop or program geared toward their clientele's needs. Each of these tools can be used in its entirety; however, a more probable use is to focus these resources on a specific topic. They can review the inventory of tools and resources to see if any current curriculum meets their needs and they can customize the lesson in the facilitator guide to feature specific labels for the activities. The evaluation tool is based on the entire food label spectrum. However, it can easily be adjusted as needed.

This content is available free to educators interested in teaching consumers about food labels. The website resource is available to all internet users and can be accessed through the direct link as well as through internet searches. The food industry is constantly trying to meet the ever-changing demands of consumers, and with that comes the creation of new labels and marketing methods. Because of the nature of this industry, periodic updating of labeling regulation changes and the expanding third-party certifications will be needed. Federal food labeling regulations must be monitored for updates, so they can then be relayed to consumers. As changes in food labeling regulations occur, updates will be made to the website and subsequent materials, although ongoing funding has not been secured to ensure that this continues. The food industry can help consumer education by remaining transparent and answering consumer questions. Consumers can be an advocate for their own knowledge by asking questions and doing research into topics that are important to their values and belief systems.

These resources were designed to meet the needs of consumers. They are one step, but we still need to create more learning opportunities surrounding consumer education on food labeling. Consumers should feel comfortable and confident when they see a food label, and one way of achieving this is through familiarizing consumers with the food industry's terminology and use of labels, claims, and statements. As consumers—particularly those who wish to make purchasing decisions that reflect their personal and social values—become more informed, they can make better purchasing decisions for themselves, their families, and their community.

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