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Organic Milk: Is it Really worth the Price?

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Introduction

Some consumers are willing to pay a significantly greater price for organic milk because they believe it to be superior to conventional milk. However, there are very few scientifically sound studies to illustrate differences in nutritional quality or value of organic versus conventional milk, and there is little or no scientific research examining possible differences in sensory attributes of the two types of milk.

Recent studies surveyed retail milk to compare nutrient compositional differences of processed milk purchased by the consumers. Studies found greater concentrations of protein (Vicini et al., 2008), polyunsaturated and conjugated linoleic acids (CLA) (Butler et al., 2011) in retail organic milk compared with conventional retail milk, and differences in fatty acid profiles (Butler et al., 2008, 2009, 2011; Ellis et al., 2006; Bergamo et al., 2003) of milks from different production systems. Additionally, folate (an important B vitamin in pregnancy) concentrations were less in organic milk due to the greater frequency of ultra-high temperature (UHT) in the processing of organic milk (Forssen et al., 2000). This article provides a summary of the current scientific knowledge on the nutritional aspects and sensory attributes of organic milk compared with conventional milk.

Some Background

Milk is an important part of the US diet as well as for those around the world. All throughout history milk has had a wholesome and a 'natural' image, and the U.S. standards of identity for dairy products (FDA 2006) have maintained this image. Milk and dairy foods are a good source of high quality protein; vitamins A, D, riboflavin and folate; and minerals: calcium, phosphorus, magnesium and potassium (Miller et al. 2007). Furthermore, there is increasing scientific information that shows the importance of dairy foods in bone health (Miller et al. 2007), weight management (Miller et al, 2007; Snijder et al., 2007), managing Type 2 diabetes (Choi et al., 2005), and high blood pressure (Steffen et al., 2005).

A fairly new niche in the dairy case at the grocery store is organic milk, as well as organic dairy foods produced from organic milk. Organic milk is produced on organic dairy farms according to the USDA organic practices. Organic milk typically sells $ 1.0 – 4.0/gal more than conventional milk at the grocery store (Vicini et al., 2008). Consumers that purchase organic milk are willing to

pay this significantly greater price because they believe organic milk to be superior to conventional milk. Unscientific consumer surveys have reported organic milk to be more nutritious, taste better (creamier), 'free' of hormones and antibiotics, and have a longer shelf life due to its higher quality. However, most consumers have very little knowledge of how milk is produced, processed and distributed to retail stores (Vicini et al., 2008).

Over the years, organic milk labeling and claims have been controversial in that milk processors making label claims that describe management of the cows (which include grazing of animals on pasture, non-use of rbST, or antibiotics) imply that this milk is better and more nutritious. In fact, there are few scientifically sound studies that show significant differences in nutritional quality of organic and conventional milk. As far as I know, there are no scientific studies done on differences in their sensory attributes taste, texture, etc.).

Earlier studies have shown that fatty acid profiles of milk from cows under organic management differ from those from conventional farms (Bergamo et al, 2003; Kraft et al 2003; Ellis et al., 2006; Butler et al., 2008, 2009). However, published results are inconsistent, sometimes contradictory, and with few differences reported for milk collected in the winter. Furthermore, these results have been obtained from milk harvested on farms and do not adequately represent the milk purchased by the consumers, which has undergone processing. More recent studies have surveyed retail milk to compare compositional differences. Vicini et al. (2008) reported minor differences in composition between organic and conventional milk; macronutrients (e.g., fat and protein) were similar except slightly greater protein in organic milk.

Conventional milk had lower microbial counts, but the researchers indicated that these differences were not biologically meaningful. In addition, conventional milk had significantly less estradiol and progesterone levels than organic milk. Whereas, concentrations of IGF-1 were lower in organic milk compared with conventional milk. These authors did not report on differences in micronutrients. Folate concentrations in milk have received much attention recently due to new data on folate's important role in preventing child birth defects. As a result, recommended dietary allowances (RDA) for folate, specifically for pregnant women, were revised (Bailey, 2000).

On average, milk and dairy products provide 10 to 15 % daily folate intake in many Western countries. However, folate concentrations have been reported significantly lower in organic milk due to routine ultra-high temperature (UHT) processing of organic milk (Forssen et al., 2000).

Butler et al. (2011) reported on fat composition of organic and conventional retail milk in northeast England. They surveyed 22 brands over a 2-year period and reported significant differences in fatty acid profiles with organic milk having greater concentrations of total polyunsaturated and conjugated linoleic acid cis-9, trans-11 and alpha-linolenic acid. Both of these fatty acids have been linked to positive health effects (Huang et al., 2007; Wahle et al., 2004; Bhattarchya et al., 2006). These differences were influenced by season and the year of the study.

None of the studies by Vicini et al (2008), Forssen et al. (2000), and Butler et al (2011), which are surveys of retail milk, provides information about the animals, management practices at the farm level, quality of the raw milk and processing conditions.

These results are further confounded by organic milk typically being ultra-high temperature (UHT) pasteurized whereas conventional milk is high temperature short-time (HTST) pasteurized. Although processors are required to pasteurize their product, they are not required to disclose method of pasteurization on their label. Due to the higher temperatures used, the UHT process provides milk with a longer shelf life regardless of the milk source. In the case of organic milk this longer shelf life is perceived to be higher quality milk by the consumer. In reality, it is most likely due to higher pasteurization temperature. Comprehensive, well-designed, scientifically sound studies that compare organic milk with conventional milk by tracking milk production from comparable farms, processed under similar conditions, and handled similarly until it reaches the consumer, are needed.

The effect of animal nutrition on milk composition particularly fat composition is well documented (Jensen, 2002; Walker et al., 2004) and manipulating the diet of the animal can alter nutritional, particularly the fatty acid, profiles in milk. Metabolic processes determining nutrient and fatty acid profiles, however, are still not totally predictable. Thus in valid scientific studies, it is important to compare milk from comparable farms that are delivered and processed under similar conditions. If significant differences showing positive attributes for organic milk are demonstrated by scientifically-sound studies, labeling claims and higher prices for organic milk at the grocery store will be justified.

Until then, is organic milk really worth the greater price at the grocery store? Ok, I'll let you answer that. You can email your answers to me at ustunol@anr.msu.edu. Your valuable perspectives can help guide our assessment of this important topic of dairy foods.

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