

## SEASONAL VARIATIONS OF BIOCHEMICAL TASTE PARAMETERS IN MILKS FROM CONVENTIONAL AND ENVIRONMENT - FRIENDLY ORGANIC FARMING

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### Abstract

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The aim of this study is to research the milk biochemical taste components in organic (ORG) and conventional (CON) systems for different season. In study, all data were investigated for all season of 2004. Milk fat levels in both groups for summer season were lower than any other season. Average milk fat values in ORG treatment were lower than the values of CON treatment in all season except winter period. Therefore, a decrease in fat percentage for organic milk can directly lead to taste loss. Similarly, total solid rates in conventional milks in spring period were more favorable than rates in organic milk for desired taste. However, the pH value in organic milk was more acceptable for required flavor in summer season.

*Key words:* Biochemical taste parameters; milk; organic; season

### Introduction

In conventional agriculture the negative environmental impact of many intensive production systems has increased the importance of more sustainable and environmentally friendly systems. In addition to environmental benefits, standards for organic livestock production provide several pre-conditions that are required to achieve good living conditions for farm animals. Consumers in wealthy countries demand high quality, safe food that is produced with minimal environmental losses, under optimal conditions for animal health and welfare (Sundrum, 2001). Changes in con-

sumer purchasing habits have had a significant impact on the retail sales of dairy products.

Understanding the effect of production systems on milk biochemical flavor components is a major importance to the milk industry because the milk and taste parameters of it influence the salability of foods and consumer preference. There has been extensive research in recent decades into milk flavor and the agents responsible for the production of milk components. However, there have been no detailed studies to find out the effect of different production systems such as organic farming on the milk flavor parameters. The aim of this investigation was to examine whether

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there were any differences between organic and conventional systems in relation to milk biochemical taste parameters.

## Materials and Methods

Data was collected from DIMES Company to compare organic (ORG) and conventional (CON) dairy farming systems during all season of 2004. Cow's milk samples were collected directly from homogenized bulk milk at determined local points and put in to the 200 mL sterile plastic container stored at 4°C and immediately transported in freeze to the laboratory and analyzed. The milk acidity (Soxhlet-Henkel, SH) was determined by AOAC procedures (AOAC, 1990). The pH of the samples was determined using a digital pH meter. Total solids (TS) fat levels of milk were determined by milk auto-analyzer. All the data are indicated as mean  $\pm$  SEM. Independent samples t-test was performed on data using SPSS.

## Results and Discussion

The milk fat rates in ORG and CON groups are presented for different seasons in Figure 1. Milk fat

rates of groups in this study are compatible with normal values for cows announced by Koneko and Cornelius (1980). Milk fat levels in both groups for summer season were lower than any other season of the 2004. Bencini and Pulina (1997) have reported that long days result in a lower fat concentration and reduced rate secretion of fat. As far as is known, climatic conditions and seasonal changes have influences on the milk composition. The fat is the most variable parameter among the major milk components and its synthesis is affected by many factors-especially dietary and environmental factors (Bayril et al., 2010). When temperature is increased the milk fat begins to decrease (Yildirim and Cimen, 2009). Since milk fat synthesis depends on the supply of acetate from the rumen, any feeding regime, such as high grain feeding which lowers the production of rumen acetate, will also lower the fat content of milk during summer season. Alderson and Pollak (1980) have reported that percentage of fat has been influenced by the seasonal variations. Accordingly, Sevi et al. (2001) found that high temperature has a negative effect on milk yield and the cheese-quality. As it is well known, the cold weather can also induce marked changes in milk production and composition (Sevi et al., 2004). Both

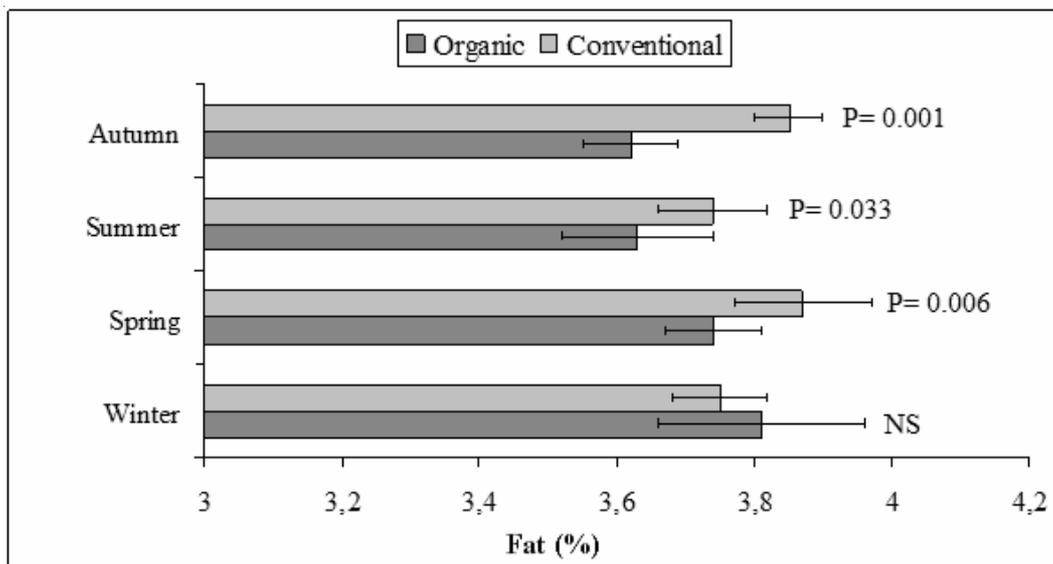


Fig. 1. Seasonal variations of fat content in milk from ORG and CON systems. NS: Not Significant ( $P > 0.05$ )

treatments were favorable for economic cheese production because, milk must contain a fat percentage at least 3.2% for economic cheese (Outlaw et al., 1993). The milk fat rates of both groups in all season were favorable for desired taste because, milk must contain a fat percentage at least 3.2 % for preferred flavor of milk (Anonymous, 2001). Average milk fat values in ORG treatment were lower than the values of CON treatment in all season except winter period.

It is a known fact that milk fat is essential for the development of the correct flavor in milk products. Therefore, a decrease in fat percentage for organic milk can directly lead to taste loss.

Milk total solid (TS) levels of groups in this experiment are compatible with normal values for cows announced by Koneko and Cornelius (1980). TS rates were the highest in the autumn season for both groups. The resulting increase in TS for this season may be an

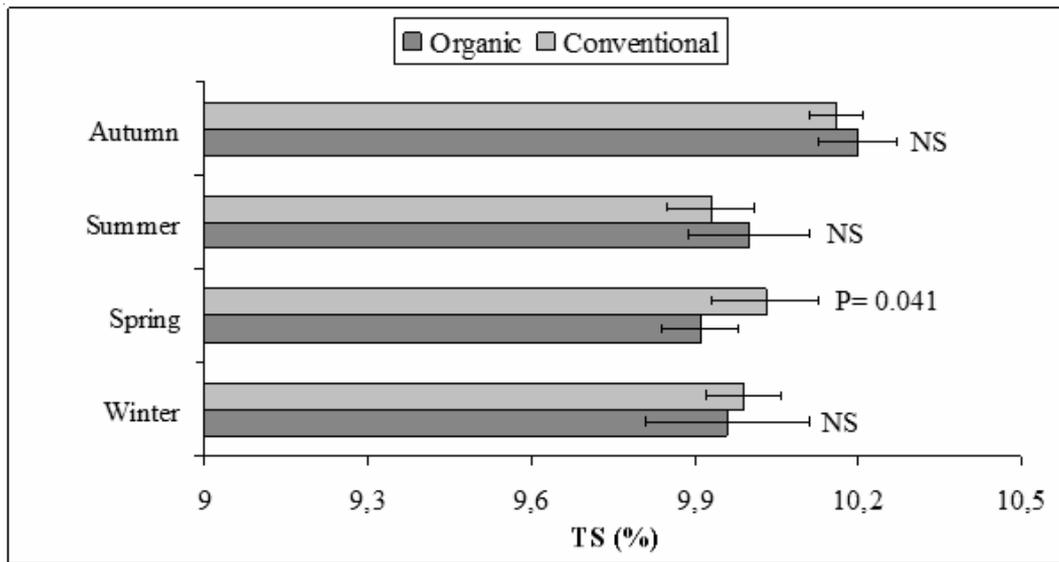


Fig. 2. Seasonal variations of total solid (TS) contents in milk from ORG and CON systems; NS: Not Significant ( $P>0.05$ ).

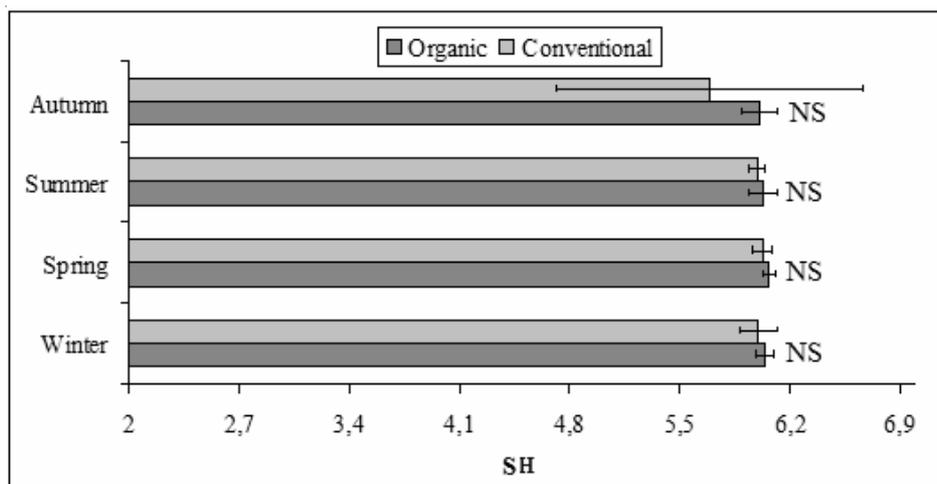


Fig. 3. Seasonal variations of sH in milk from ORG and CON systems; NS: Not Significant ( $P>0.05$ )

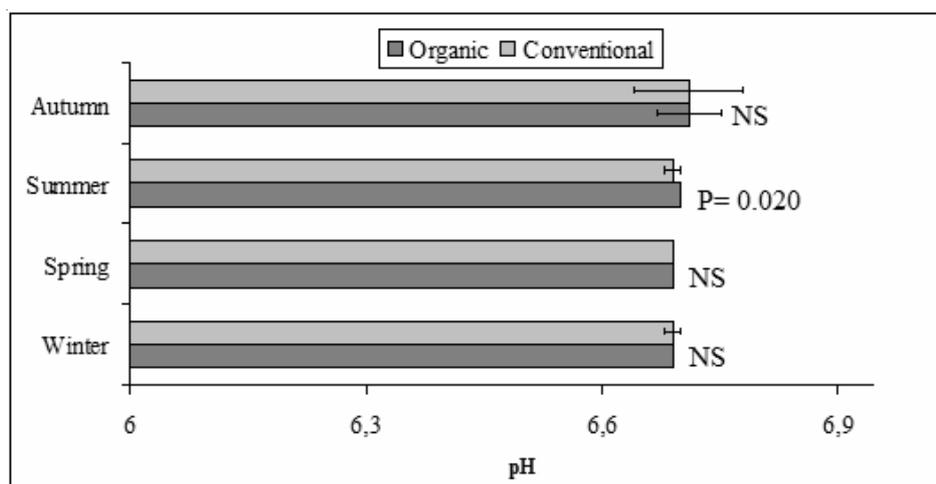


Fig. 4. Seasonal variations of pH in milk from ORG and CON systems; NS: Not Significant ( $P>0.05$ )

economic advantage to cheese manufacturers. Also, it may have a favorable impact on the consumer's preference. However, TS values were similar for both groups in all season except spring (Figure 2). The TS rates of conventional group were higher in spring season ( $p<0.04$ ). These rates for CON group in spring period were more favorable than rates in organic milk for desired taste. As is known, flavor is positively affected with increasing TS (Janzen and Rogers, 1967).

There were no significant differences between treatments in change of milk sH levels for all periods (Figure 3). Milk acidity values of groups in this study are compatible with normal values for sheep announced by Koneko and Cornelius (1980). It has been explained in The Turkish Food Regulation that the acidity of cows' milk is not more than 8 milk acidity (sH) (Kurt et al., 2003).

As shown the Figure 4, the pH values of CON milks were higher than ORG milks in summer period ( $p<0.02$ ) (Figure 4). The milk pH level in ORG treatment was more tolerable for desired taste in summer season. As is known, the high pH value in milk is not desirable for flavor. In addition, sourness is the undesirable taste that detects acidity (Bayril et al., 2010). Milk fat furnishes energy and is important in taste and palatability considerations of dairy foods. Low fat levels in organic milks can lead to economical loss since

the milk price depends on milk fat percentage. In addition, this decrease in fat can directly lead to taste loss.

Similarly, TS rates in conventional milks in spring period were more favorable than rates in organic milk for desired taste. On the contrary, the pH value in ORG treatment was more tolerable for desired taste in summer season.

While many studies demonstrate qualitative differences between organic and conventional foods, data do not exist to ascertain whether the differences in the levels of biochemical taste parameters between organic foods and conventional foods are of biological significance. Therefore, science must focus on the facts at hand which have been generated by well designed and conducted research studies.

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