ENHANCING THE KEEPING QUALITY OF RAW SHEEP MILK BY DIFFERENT METHODS

KOYUN SÜTÜNÜN FARKLI YÖNTEMLERLE MUHAFAZASI[1]

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ABSTRACT: In this study, enhancing the keeping quality of raw sheep milk was attempted by the addition of hydrogen peroxide in two different concentrations (100 ppm and 400 ppm), the activation of the lactoperoxidase (LP) system by adding two different concentrations (ppm) in equimolar ratios of thiocyanate and hydrogen peroxide (20:20 and 60:60) and cooling. Control (without additive), hydrogen peroxide treated and LP activated samples were kept at 20 ± 1°C and 35 ± 1°C for 15 hours whereas the cooled milk was kept at 5 ± 1°C. For the same period titratable acidity, resazurin test, rennet coagulation time and starter culture activity were determined in milk samples at 3 hours intervals.

The results showed that a significant improvement in enhancing the keeping quality of raw sheep milk could be obtained by the activation of the LP-system and the addition of hydrogen peroxide. But cooling was the best method for the preservation of raw sheep milk.

ÖZET: Bu çalışmada, koyun sütünün laktoperoksidaz sisteminin (LP) aktivasyonu, Hidrojen peroksit ilavesi ve soğutma yöntemleri ile muhafazası incelenmiştir. Laktoperoksidaz sisteminin aktivasyonu, sütlere 20:20 ppm ve 60.60 ppm tiyosiyonat:Hidrojen peroksit ilavesiyle sağlanırken, Hidrojen peroksitle muhafazada, sütlere 100 ppm ve 400 ppm Hidrojen peroksit ilave edilmiştir. Kontrol (katkısız süt), LP sistemi aktive edilmiş sütler ve Hidrojen peroksit ilave edilmiş sütler 20± 1°C ve 35± 1°C'lerde, dördüncü bölüm sütler ise 5 ± 1°C'de 15 saat süreyle bekletilmiştir. Örneklerde üçer saatlik aralıklarla titrasyon asitliği, resazurin, pıhtılaşma ve starter aktivitesi testleri yapılmıştır.

Araştırma sonucunda, koyun sütlerinin muhafazasında soğutmanın en etkili yöntem olduğu belirlenirken, LP sisteminin aktivasyonundan ve sütlere Hidrojen peroksit ilavesinden yararlanılabileceği de görülmüştür.

INTRODUCTION

In Turkey, although the share of sheep milk in total milk production is important, milking, collection and transportation of raw sheep milk present a number of technical and organizational problems. Milking is done by hand under poor hygienic conditions, and refrigeration facilities are not always adequate or available. Furthermore, it is often necessary to transport raw milk over long distance. The combination of high ambient temperatures, poor hygienic conditions and other factors results in the rapid deterioration of raw sheep milk during storage and transportation. Therefore, different methods have been tried to prolong the keeping quality of raw sheep milk.

The purpose of this study was to evaluate the preservative effect of the LP-system and Hydrogen peroxide treatment on raw sheep milk kept at two different temperatures (20 and 35°C).

MATERIALS AND METHODS

Sheep milk was obtained from a private farm. Hydrogen peroxide (30% solution) and ammonium thiocyanate were supplied from Merck Chemical Company. Lactic Starter Culture was from Chr.Hansen Lab. Inc.. Rennet solution was manufactured by Mayasan Company.

In this study, 100 ppm or 400 ppm hydrogen peroxide were used in H_2O_2 - preserved samples. To activate the LP-system, 20:20 ppm SCN: H_2O_2 and 60:60 ppm SCN: H_2O_2 were added to milk samples. These samples were kept for 15 hours at 20°C and 35°C. Raw sheep milk was also kept for 15 hours at 5 ± 1°C to compare the effects of the treatments with that of cooling. Titratable acidity, resazurin test, rennet coagulation time and starter culture activity were determined in milk samples at 3 hours intervals.

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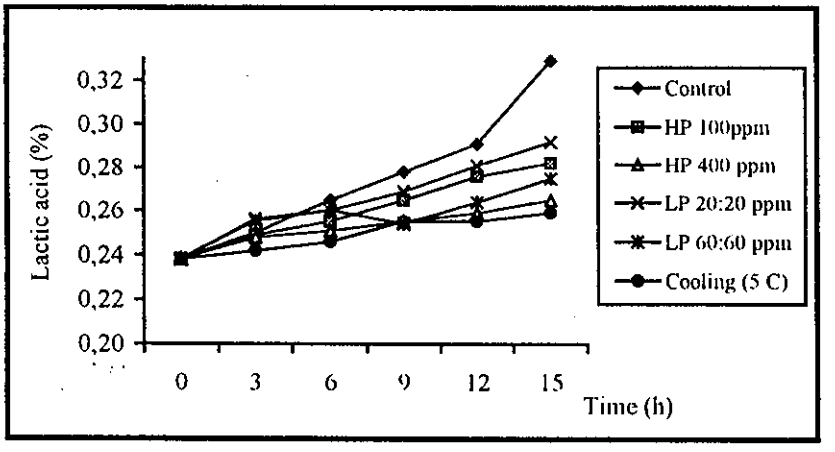
Titratable acidity was determined by the method (Soxhelet-Henkel) of ANONYMOUS (1981), resazurin test according to the methods of BJÖRCK et al (1979), rennet coagulation time by the method of BJÖRCK (1978) and starter culture activity was determined by the modified method of BASAGA and DIK (1994). For each type of treatment four separate experiments were made.

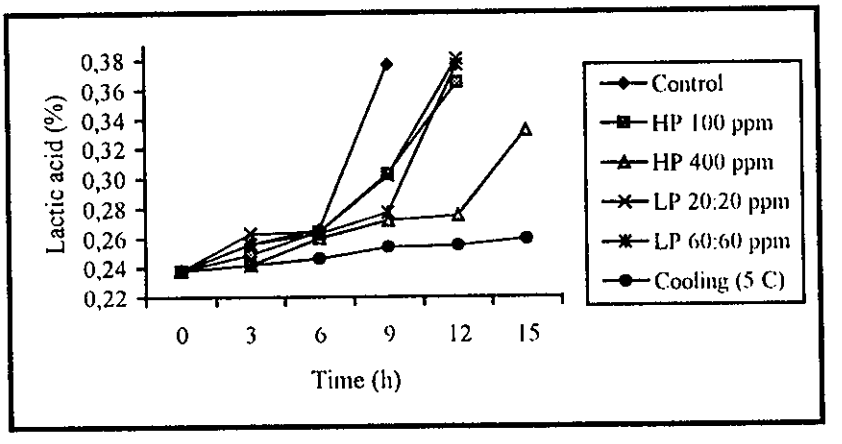
RUSULTS AND DISCUSSION

As shown in Figures 1 and 2, the keeping quality of sheep milk could be improved by the activation of the LP-system and the addition of H_2O_2. The effects of these treatments on the keeping quality of sheep milk were found to be related to temperature and concentration. Hydrogen peroxide treatment was more effective than the LP-system at 35°C as evaluated by titratable acidity. However, H_2O_2- treatment (400 ppm) and the LP-system (60:60 ppm) were more effective than H_2O_2- treatment (100 ppm) and the LP-system (20:20 ppm) at 20°C as evaluated by titratable acidity. The differences among the titratable acidity values of samples were significant ($p<0,01$) at 20°C and 35°C.



Figur 1. Effect of different preservation methods on acidity development in raw sheep milk stored at 20°C

The results obtained undoubtedly showed that cooling is the ideal method to prolong the keeping quality of raw sheep milk, and are in agreement with the those of KAMAU and KROGER (1984), OYSUN and ÖZBEK (1988) and Savcı (1991). The resazurin test results were very closely related to the acidity test results. The H_2O_2- treated samples (400 ppm and 100 ppm) were found to be acceptable after 15, 6 and 9, 6 h at 20 and 35°C, respectively, having resazurin values of 6. The LP-activated samples (60:60 ppm and 20:20 ppm) were found to be acceptable after 9, 3 and 9, 3 h. At 20 and 35°C, respectively. The cooled milk samples were acceptable after 15 h. These results are agree with the results of KAMUA and KROGEN (1984).



Figur 2. Effect of different preservation methods on acidity development in raw sheep milk stored at 35°C

The activity of the starter culture in the preserved samples decreased depending on the increase in the concentration of the additives. Smilarly, rennet coagulation time decreased by increasing the concentration of the additives.

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