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AZIDIOL AS A PRESERVATIVE FOR MILK SAMPLES

Azidiol como conservante de muestras de leche

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SUMMARY

In order to evaluate the possibility of using the same preserved milk samples for different analysis by milk testing laboratories, it was investigated the use of azidiol (sodium azide/chloramphenicol) as a liquid preservative for chemical, bacteriological and cytological evaluations. Azidiol was added inmediately after milking in half of the samples, the others were used as witness. Analyses were made using an infra-red milk analyzer (Milko-Scan), a Bactoscan and a Fossomatic counter.

Life of milk was increased with azidiol as storage temperature was lowered from 20° C to 4° C. Samples for chemical analysis with azidiol could be preserved more than 15 days at 4° C and at least a weed at 20° C. Mean life of samples for bacteriological evaluation in the presence of the preservative varied depending on the temperature of the storage. At 4° C changes were not significant by the Bacto-Scan method and at 20° C milk samples were preserved 3 days (the same time that at 4° C without azidiol).

Cytological test gave the same results with and without azidiol when storage temperature was 4° C. However, the mean life of milk with azidiol at 20° C is reduced to 2 days.

Key-words: Preserved milk, azidiol.

RESUMEN

Con objeto de evaluar la posibilidad de utilizar la misma muestra de leche conservada para diferentes determinaciones en los Laboratorios Interprofesionales, investigamos el uso del azidiol (azida sódica/cloranfenicol) como conservante líquido para evaluaciones químicas, bacteriológicas y citológicas. Las muestras fueron tomadas inmediatamente después del ordeño y el conservante se adicionó en la mitad de ellas, quedando las restantes como testigo. Las determinaciones se realizaron utilizando un analizador infra-rojo de leche (Milko-Scan), un Bactoscan y un Fossomatic.

Los resultados mostraron que las muestras con conservante para el análisis químico, pueden ser mantenidas más de 15 días a 4° C, y al menos una semana a 20° C. Al evaluar la calidad bacteriológica, la vida media de las muestras de leche con azidiol mostró variaciones dependientes de la temperatura de almacenamiento; a 4° C no se encontraron cambios significativos por el método Bacto-Scan; a 20° C las muestras de leche se conservaban 3 días (el mismo tiempo que sin azidiol a 4° C).

El análisis citológico no fue afectado por el tiempo de almacenamiento de las muestras cuando la temperatura fue 4° C. Sin embargo, a 20° C la vida media de la leche con azidiol se reduce a 2 días.

Palabras clave: Leche conservada, azidiol.

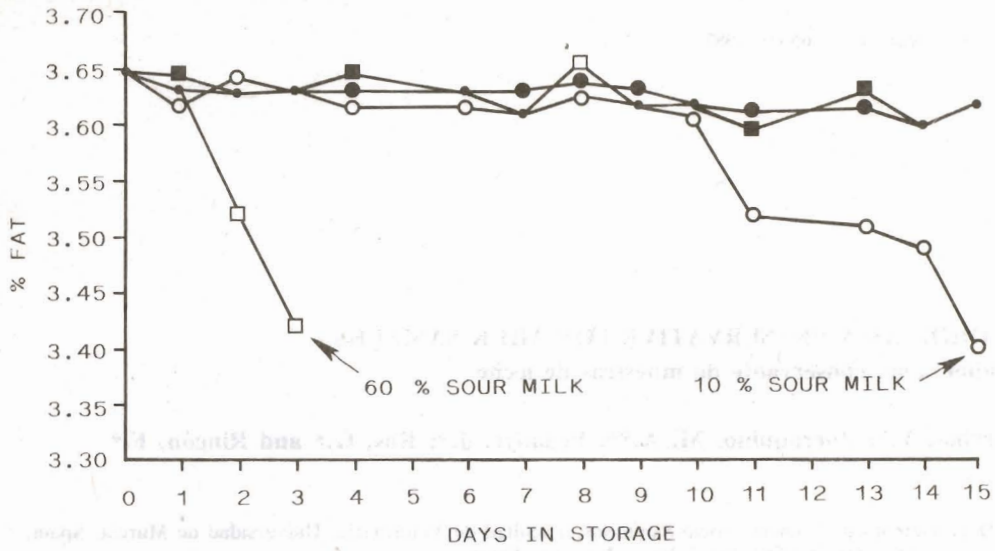

FIGURE 1. Changes of fat content in milk stored with azidiol at 4° C (●) and 20° C (O), and without preservative at 4° C (■) and 20° C (□). The statistical significance is given in the text.

INTRODUCTION

The development of milk testing laboratories and alternative methods of automatic milk analysis requires the use of a milk sample preservative that can assure «testability of sample» (KROGER, 1985).

It is best that the same preservative be used for chemical, bacteriological and cytological evaluation of milk (RAPP y MÜNCH, 1984) and effective for several days (JENNET and GRAPPIN, 1979).

Several substances and formulas (ARDO, 1982; DUNHAM et al., 1978; NGKWAI-HANG and HAYES, 1982; SANDHU et al.; 1984; SCHMIDT-MADSEN, 1979; ZAKIR et al., 1984), that satisfy the basic requirements, have been used to preserve milk samples for routine analysis by milk testing laboratoires but the search for the ideal milk sample preservative still continues.

The purpose of this communication is to investigate the possibility of using a new liquid preservation agent, azidiol (RAPP and MUNCH, 1984), as the sole preservative in milk samples to determine the composition of cow's milk with routine apparatus and instruments in milk testing laboratories: a Milko-Scan, a Bacto-Scan and a Fossomatic®.

MATERIAL AND METHODS

Origin and preparation of milk samples

Separate milk samples were obtained inmediately after milking from 10 individual cows of Navarre (Spain), and the day of the milk collection is referred to as day O. Milk samples were distributes into four groups (A, B, C, D). 0'1 ml azidiol (containing 12 mg sodium azide and 0'5 mg chloranphenicol/100 ml. milk) was added as a preservative to 30 ml. of milk in groups A and C, whereas groups B and D were used as withess. All samples wered stored during 15 days at 4° C (groups A and C) or at 20° C (groups B and D).

Analyses

Milk samples were analysed for fat, protein and lactose by the infrared method by a Milko-Scan. Cell counts were performed with the Fossomatic according to the manufacturer's manual and standard methods for somatic cell counting in milk (ANON, 1978). Bacteriological evaluation was carried out by a Bactoscan. Samples were tested every day of the storage time.

Statistical Analyses

It was calculated the variance, and carried out the Duncan's multirange tests (SOKAL and ROHLFF, 1979).

RESULTS AND DISCUSSION

The efficiency of the azidiol as a preservative

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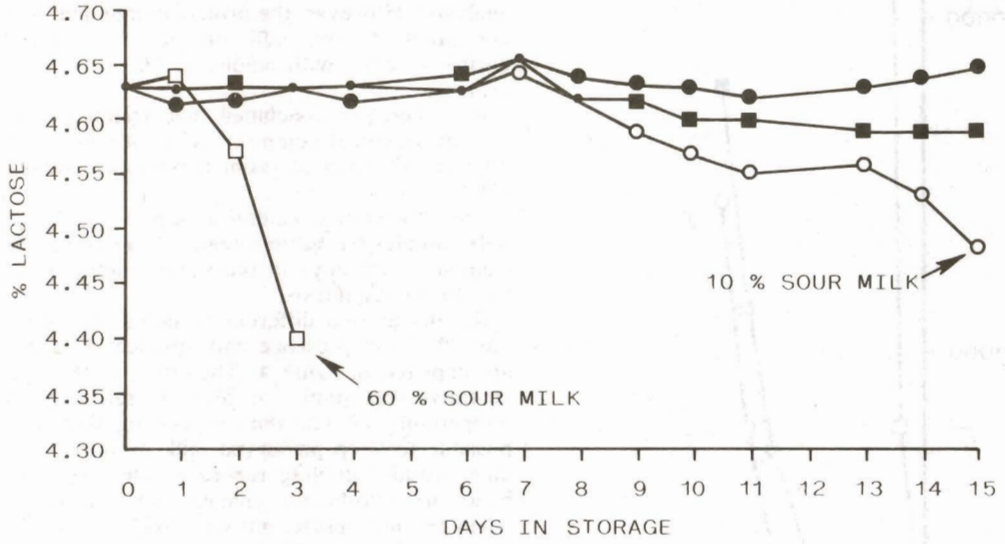

FIGURE 2. Changes of lactose content in milk stored with azidiol at 4° C (●) and 20° C (O), and without preservative at 40° C (■) and 20° C (□). The statistical significance is given in the text.

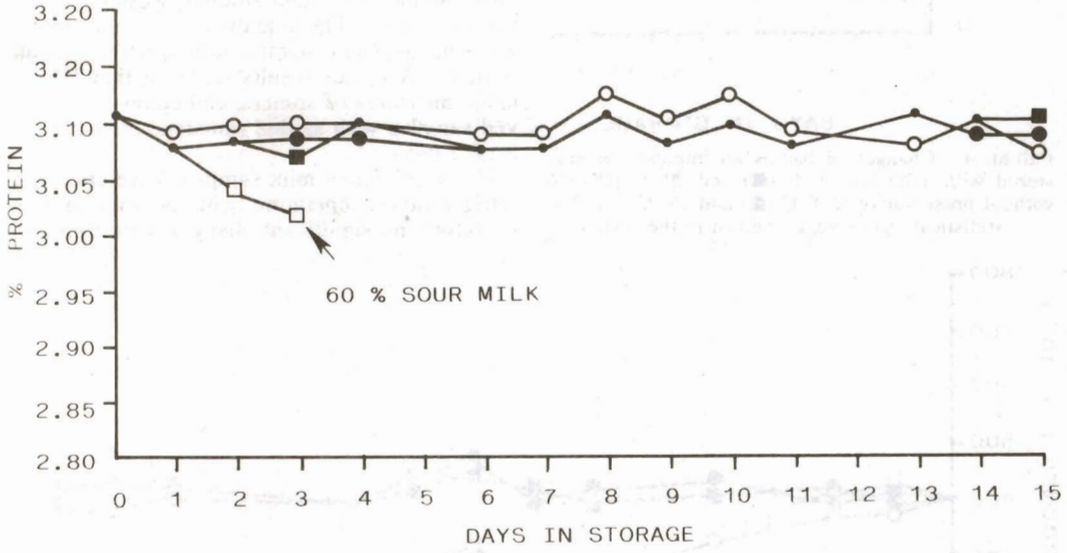

FIGURE 3. Changes of protein content in milk stored with azidiol at 4° C (●) and 20° C (O) and without preservative at 4° C (■) and 20° C (□). The statistical significance is given in the text.

in milk samples for the determining of chemical components using Milko-Scan during the storage time following the protocol described in material and methods, is shown in figure 1 for fat, figure 2 for lactose and figure 3 for protein.

The effect of the azidiol on the mean life of raw milk samples has been investigated at two temperatures, 4° C and 20° C, and the results compared with the main components in milk without any preservative.

All milk samples were preserved with azidiol at 4° C during the storage time for analysis of fat, lactose and protein. Samples stored more than a week at 20° showed significant alterations ($p<0'01$) of fat and lactose components of milk compared with the control (first day of

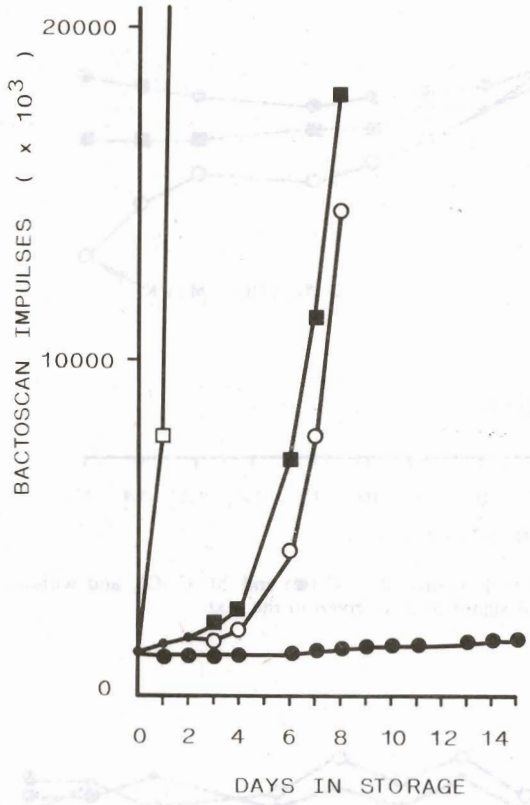

FIGURE 4. Changes of bactoscan impulses in milk stored with azidiol at 4° C (■) and 20° C (O) and without preservative at 4° C (■) and 20° C (□). The statistical significance is given in the text.

analysis). However, the protein component was not modified when milk samples were stored during 15 days with azidiol at 20° C prior to analysis.

It is therefore concluded that azidiol preserves the chemical components of milk better at refrigeration than at room temperature (about 20° C).

The efficiency o azidiol as a preservative in milk samples for bacteriological evaluation was studied for 15 days in the same conditions as for chemical analysis.

Results at two different temperatures (4° C and 20° C) in presence and absence of azidiol are depicted in figure 4. The effect of the preservative was similar at 20° C to refrigeration temperature (4° C), thus suggesting that it is possible to keep preserved milk samples for 3 days without cooling recorded. On the other hand, no significantt changes were recorded when the milk preserved with azidiol was stored at 4° C during 15 days.

Cell count is an analysis usually carried out in a quality payment scheme. Therefore, the effect of azidiol in the cytological evaluation of milk samples was also studied. Results are given in figure 5. The somatic cell counts decreased similarly and significantly ($p<0'01$) in all samples. Also our results reported that Fossomatic measures of somatic cell count of preserved samples with azidiol remained stable for at least 2 days.

However, when milk samples were stored at refrigeration temperature with or without preservative, no significant changes were found in

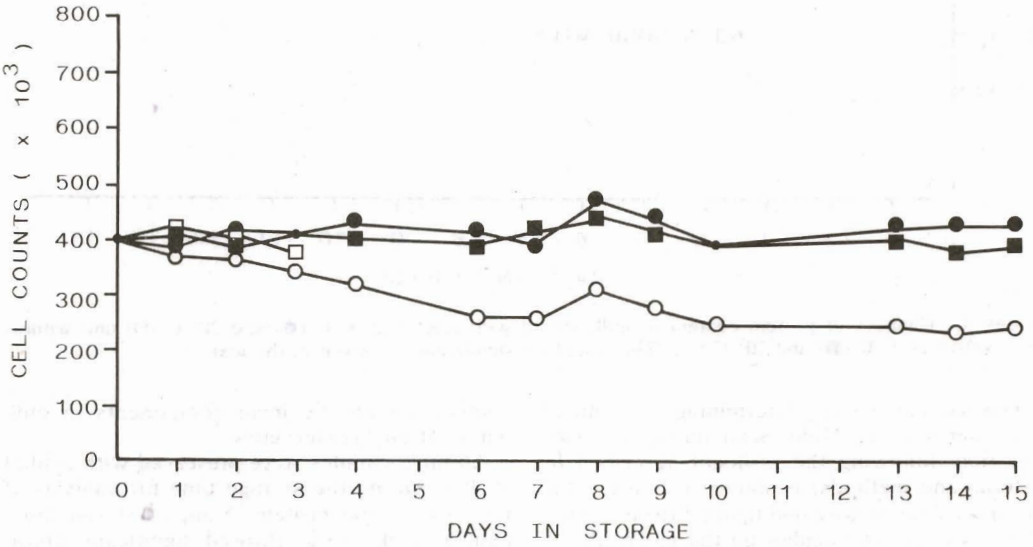

FIGURE 5. Changes of somatic cells content in milk stored with azidiol at 4° C (●) and 20° C (O), and without preservative at 4° C (■) and 20° C (□). The statistical significance is given in the text.

cell counts, most variations were due to the instrument.

In conclusion, azidiol may be used in a quality payment scheme for chemical, bacteriological and cytological evaluation of milk, because the milk sample maintains its original composition from the time of milking to that of analysis; longer preservation is achieved if the milk is stored with the preservative at low temperatures, as reported by other authors for different milk preservatives (KENNEDY et al., 1982; KWON and KIM, 1982; RAIMOND and KROGER, 1974), because when the storage temperature of samples is under 20° C, the analysis remained stable over 2 days, and when the temperature was 4° C the milk components were not modified for at least one week.

REFERENCES

ANON 1978: Standard method for somatic cell counting in milk, IDF Bull., doc. 41.

ARDÓ, Y. 1982: Bronopol as a preservative in milk samples for the determination of cell content using Fossomatic. Milchwissenschaft. 37: 139-142.

DUNHAM, J. R.; BECHTLE, H.; OBERLANDER, M. 1978: Chlorinated quaternized hexamine and potassium as preservative for milk samples. J. Dairy Sci. 61: 1.696-1.699.

JENNET, R.; GRAPPIN, R. 1979: Reservation of milk samples with bronopol. Rev. Lait Fr. 380: 37-38.

KENNEDY, B. W.; SETHAR, M. S.; TONG, A. K. W.; MOXLEY, J. E.; DOWNEY, B. R. 1982: Environmental factors influencing test-day somatic cell counts in Holsteins. J. Dairy Sci. 65: 275-280.

KWON, I. K.; KIM, H. U. 1982: Studies on the preservation of raw milk samples for the infra-red milk analyzer. Korean J. Dairy Sci. 4: 75-83.

KROGER, M. 1985: Milk sample preservation. J. Dairy Sci. 68: 783-787.

RAYMOND, A. M. J.; KROGER, M. 1974: Physicochemical and bacteriological aspects of preserved milk samples and their effect on fat percentage as determined with the milko-tester. J. Milk Food Technol. 37: 123-128.

NG-KWAI-HANG, K. F.; HAYES, J. F. 1982: Effect of potassium dichromate and sample storage time on fat and protein by Milko-Scan and on protein and casein by modified Pro-Milk Mk II method. J. Dairy Sci. 65: 1.895-1.899.

RAPP, M.; MÜNCH, S. 1984: Newly developed liquid preservation agents for milk samples. Dtsch. Molk. Ztg. 105: 1.264-1.272.

SANDHU, J. S.; NASIR, N.; NARAYANASWAMY, H.; KAPOR, O. P. 1984: Study on the effect of formalin as a preservative on different constituents of raw milk samples during storage. J. Food Sci. Technol. India 211: 424-425.

SCHMIDT MADSEN, P. 1979: Influence of storage and preservation of milk samples on microscopic and Fossomatic cell counts. Nord. Vet. Med. 31: 449-454.

SOKAL, R. R.; ROHLFF, F. J. 1979: Biometría. Blume. Madrid.

ZAKIR, M. D.; NARASIMHA, G.; RAGHVA, V.; MALLAYYASASTRI, P. 1984: Effect of certain preservatives on composite milk samples stored at room temperature. Indian J. Dairy Sci. 37: 30-32.