Faculty of Agricultural and Food Sciences
University of Sarajevo
Bosnia and Herzegovina

Faculty of Agriculture
Ege University, Izmir
Republic of Turkey

International Burch University Sarajevo
Bosnia and Herzegovina

Uludağ University Bursa
Republic of Turkey

24th International Scientific-Expert Conference of Agriculture and Food Industry

Book of Abstracts

Sarajevo
September 25-28, 2013

24th INTERNATIONAL SCIENTIFIC-EXPERT CONFERENCE OF AGRICULTURE AND FOOD INDUSTRY

organized by

Faculty of Agricultural and Food Sciences, University of Sarajevo, Bosnia and Herzegovina
and
Faculty of Agriculture, Ege University Izmir, Republic of Turkey

in cooperation with

Uludağ University, Bursa, Republic of Turkey
and
International Burch University, Sarajevo, Bosnia and Herzegovina

Presidency of the Conference

Prof. dr Mirsad Kurtović, President of the Conference, Dean of the Faculty of Agricultural and Food Sciences, University of Sarajevo, Bosnia and Herzegovina;
Prof. dr Akin Olgun, Deputy President of the Conference, Dean of the Faculty of Agriculture, Ege University, Republic of Turkey;
Prof. dr Hüseyin Padem, Rector of the International Burch University, Bosnia and Herzegovina;
Prof. dr Ismail Filya, Dean of the Faculty of Agriculture, Uludağ University, Bursa, Republic of Turkey.

Organizing Committee

Prof. dr Hamid Čustović, President of the Organizing Committee, Faculty of Agricultural and Food sciences, University of Sarajevo, Bosnia and Herzegovina;
Prof. dr Enver Durmusoglu, Deputy President of the Organizing Committee, **Prof. dr Omer Lütfi Elmeci, Assoc. Prof. dr Berna Turkekul**, Faculty of Agriculture, Ege University, Republic of Turkey;
Prof. dr Ismail Filya, Dean of the Faculty of Agriculture, Uludağ University, Bursa, Republic of Turkey;
Mr. sci. Serkan Dogan, International Burch University, Sarajevo, Bosnia and Herzegovina;
Jerko Ivanković-Lijanović, Minister of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina;
Damir Mašić, Minister of Education and Science of the Federation of Bosnia and Herzegovina;
Prof. dr Damir Marjanović, Minister of Education, Science and Youth Sarajevo Canton, Bosnia and Herzegovina;
Prof. dr Senaid Memić, Mayor municipality Ilidža, Bosnia and Herzegovina;
Prof. dr Sabahudin Bajramović, Prof. dr Hamid Bogućanin, Prof. dr Selim Škaljić, Prof. dr Zlatan Sarić, Prof. dr Drena Gadžo, Prof. dr Muhamed Brka, Asst. Prof. Halil Omanović, Ph.D., Faculty of Agricultural and Food sciences, University of Sarajevo, Bosnia and Herzegovina;

Scientific committee

Prof. dr Milenko Blesić, President of the Scientific Committee, Faculty of Agricultural and Food sciences, University of Sarajevo, Bosnia and Herzegovina;
Prof. dr Hülya Ilbi, Deputy President of the Scientific Committee, **Prof. dr Bülent Miran, Prof. dr Adnan Degirmencioglu, Prof. dr Muzaffer Tosun, Prof. dr Turgay Taşkin, Prof. dr Ayse Gül**, Faculty of Agriculture, Ege University, Republic of Turkey;
Assoc. prof. dr Orkun Barış Kovanci, Faculty of Agriculture, Uludağ University, Bursa, Republic of Turkey;
Prof. dr Hüseyin Padem, Rector of the International Burch University, Bosnia and Herzegovina;
Prof. dr Olga Martin Belloso, Department of Food Tehnology, University of Lleida, Lleida, Spain;
Prof. dr Catherine Beal, AgroParisTech, INRA, Thiverval Grignon, France;
Prof. dr Emil Erjavec, Biotehniška fakulteta, Univerza v Ljubljani, Slovenia;
Prof. dr Metka Hudina, Biotechnical Faculty, Department of Agronomy, University of Ljubljana, Ljubljana, Slovenia;
Prof. dr Cosmin Salasan, Banat's University of Agricultural Sciences and Veterinary Medicine, Timisiora, Romania;
Prof. dr Vlado Guberac, Faculty of Agriculture in Osijek, Josip Juraj Strossmayer University, Osijek, Croatia;
Prof. dr Natalija Bogdanov, Faculty of Agriculture, University of Belgrade, Serbia;
Prof. dr Nenad Georgiev, Faculty of Agricultural Sciences and Food, Ss. Cyril and Methodius University in Skopje, Macedonia;
Prof. dr Ferdo Bašić, Faculty of Agriculture, University of Zagreb, Croatia;
Assoc.Prof. Dr. Michael Murkovic, Graz University of Technology, Institute of Biochemistry, Austria;
Doc. dr Paride D'Ottavio, Department of Agriculture, Food and Environmental, University of Ancona, Italia;
Prof. dr Pakeza Drkenda, Prof. dr Nermina Spaho, Prof. dr Mirha Đikić, Prof. dr Zilha Ašimović, Prof. dr Aleksandra Nikolić, Asst. Prof. Lutvija Karić, Ph.D., Asst. Prof. Emir Džomba, Ph.D., Faculty of Agricultural and Food Sciences, University of Sarajevo, Bosnia and Herzegovina.

The named authors are fully responsible for contents, contact information's, and correctness of English of the summaries printed in this Book of Abstracts.

Editors: Milenko Blesić, Belma Dučić; Printed by: Štamparija Fojnica – D.D. Fojnica

http://www.agriconference.ba

EMULSIFYING PROPERTIES OF CAPRINE MILK: THE INFLUENCE OF pHs

Pešić M.B.[1], Barać M.B.[1], Stanojević S.P.[1], Maćej, O.D.[1], Vrvić M.M.[2]
[1]Faculty of Agriculture, Institute of Food Technology and Biochemistry, University of Belgrade, Belgrade, POB 14, Serbia
[2]Faculty of Chemistry and Department of Chemistry IChTM, University of Belgrade, Belgrade, POB 51, Serbia

Summary

During recent years, an increasing interest has developed in foods that contribute to a positive effect on health beyond their nutritional value. Among these functional foods, much attention has been focused on caprine milk and its dairy products. Caprine milk has been described as having a higher digestibility and lower allergenicity than bovine milk and was recognized as a source of valuable bioactive peptides. Emulsifying properties of milk proteins are well established, making them the most studied of the food proteins and widely used in food formulations. Reports on caprine milk proteins in emulsions are very limited unlike the numerous literatures corresponding to bovine milk.

In the present study, emulsifying properties of thermally treated caprine skim milk (90°C, 10 min) at different pHs of milk (from 6.5 to 7.1) were investigated according to the procedure proposed by Pearce and Kinsella (1978). The obtained results indicated that heat treatment of caprine skim milk increased emulsion stability and decreased emulsion activity about two times compared to values obtained for emulsion prepared with raw caprine skim milk. The emulsifying stability index and emulsifying activity index of heated caprine milk showed a dependent behaviour on pH. Maximum emulsion stability was registered at pH 9 (ESI was 201.52 min), whereas minimum was observed at pH 6.5 (ESI was 91.71 min). Maximum emulsion activity was at pH 6.5 and 6.7 (EAI was about 68 m^2/g), whereas minimum was at pH 9 (EAI was 56.05 m^2/g). The observed changes in emulsifying properties of heat-treated caprine milk could be attributed to whey protein/casein complexes formed during heating of milk.

Key words: caprine milk, thermal treatment, emulsifying properties

Emulsifying properties of caprine milk: the influence of pHs

Mirjana B. Pešić[1], Miroljub B. Barać[1], Slađana P. Stanojević[1] , Ognjen D. Maćej[1], Miroslav M. Vrvić[2]

[1] University of Belgrade - Faculty of Agriculture, Department of Chemistry and Biochemistry, Institute of Food Technology and Biochemistry, Nemanjina 6, 11081 Zemun – Belgrade, POB 14, Serbia

[2] University of Belgrade - Faculty of Chemistry and Department of Chemistry IChTM, Studentski trg 12-16, 11158 Belgrade, POB 51, Serbia

24th INTERNATIONAL SCIENTIFIC-EXPERT CONFERENCE IN AGRICULTURE AND FOOD INDUSTRY

Sarajevo, September 25-28, 2013

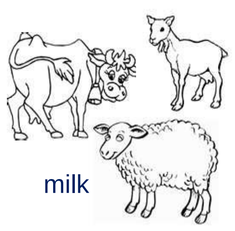
Introduction

During recent years, an increasing interest has developed in foods that contribute to a positive effect on health beyond their nutritional value. Among these functional foods, much attention has been focused on caprine milk and its dairy products. Caprine milk has been described as having a higher digestibility and lower allergenicity than bovine milk and was recognized as a source of valuable bioactive peptides (1,2).

Heat treatment of milk and dairy products is one of the essential operations in most dairy processes. This operation is applied either to enhance technological-functional properties of final products or to ensure its safety and shelf life. During heat treatment, the formation of protein complexes among denatured whey proteins, mainly β-lactoglobulin (β-LG) and α-lactalbumin (α-LA), and κ-casein (κ-CN) were occurred (3). The importance of these complexes is well known. They affect many dairy processes such as cheesemaking, yoghurt-making, storage of UHT milk and preparation of functional ingredients. Emulsifying properties of milk proteins are well established, making them the most studied of the food proteins and widely used in food formulations. But, all of these findings were obtained by studying bovine milk. So, the question is: Weather the knowledge gained by studying the bovine milk could be applied to the caprine milk? Until now, only a few studies were performed concerning the formation of WP/κ-CN complexes in heat-treated caprine milk and bahavior of caprine milk proteins in emulsions.

Therefore, the objective of this study was to evaluate emulsifying properties of caprine skim milk thermally treated at different pHs of milk (from 6.5 to 7.1) according to the procedure proposed by Pearce and Kinsella (4).

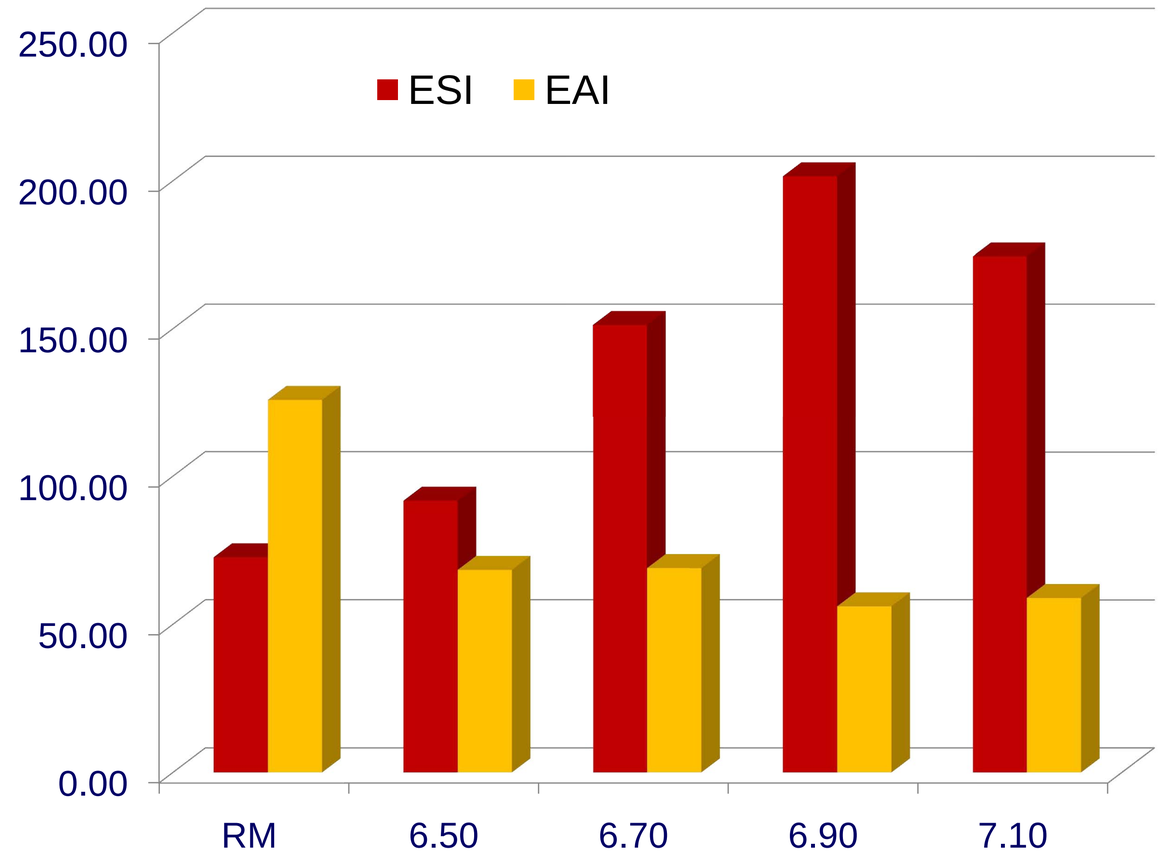
Sample preparation



Emulsifying properties

Pure sunflower oil (15 ml) and 45 ml of 0.1% aqueous solution of milk samples were homogenised with high speed homogenizer (MSE – Homogeniser, Measuring & Scientific Equipment ltd., Spenser st., London, S.W1, England) at highest settings for 1min. Fifty-micro litre portions of the emulsion was pipetted from the bottom of the container at 0 and 10 min after homogenization. Each portion was diluted with 10mL of 0.1% (w/v) SDS solution. Absorbance of diluted emulsion was measured at 500 nm. The absorbance measured immediately (A_0) and 10 min (A_{10}) after emulsion formation was used to calculate the emulsifying activity index (EAI) and the emulsifying stability index (ESI).

Results



ESI (min)	72.61	91.71	151.25	201.52	174.42
EAI (m^2/g)	125.93	68.35[a]	68.95[a]	56.05	58.96

Means with the same letters within the same row are not significantly different ($p < 0.05$).

Figure 1. Emulsifying properties of caprine skim milk thermally treated at different pHs (6.5, 6.7, 6.9, and 7.1)

Discussion

The obtained results indicated that heat treatment of caprine skim milk increased emulsion stability and decreased emulsion activity about two times compared to values obtained for emulsion prepared with raw caprine skim milk. The emulsifying stability index and emulsifying activity index of heated caprine milk showed a dependent behaviour on pHs. Maximum emulsion stability was registered at pH 6.9 (ESI was 201.52 min), whereas minimum was observed at pH 6.5 (ESI was 91.71 min).Maximum emulsion activity was at pH 6.5 and 6.7 (EAI was about 68 m^2/g), whereas minimum was at pH 6.9 (EAI was 56.05 m^2/g).

The observed changes in emulsifying properties of heat-treated caprine milk could be attributed to whey protein/casein complexes formed during heating of caprine milk**.** Recently, it was reported that heat treatment of caprine milk at natural pH of milk (6.7) induced formation of micelle-bound complexes (5). These complexes, uniformly distributed on the surface of caprine casein micelles could significantly changed the behaviour of caprine milk proteins on the surface of oil droplets during emulsion formation. Casein micelles with small, well distributed denatured whey proteins on their surfaces probably enhance stability of protein films formed around the oil droplets and decrease emulsion activity compared to emulsions formed by raw skim milk. The differences of emulsifying properties of caprine milk heated at different pHs indicated to different distribution, size or structure of whey protein/casein complexes formed during heating of caprine milk.

Conclusions

Heat treatment of caprine milk at different pHs of milk significantly changed its emulsifying properties. This could be attributed to whey protein/casein complexes formed during heating of caprine milk**.** However, further research will be needed to test how heat-induced complexes formed at different pHs of milk affect emulsifying properties of caprine milk.

References

1. Park, Y. W., Juárez, M., Ramos, M., & Haenlein, G. F. W. (2007). Physico-chemical characteristics of goat and sheep milk. *Small Ruminant Research, 68(1-2), 88-113.*

2. Haenlein, G. F. W. (2004). Goat milk in human nutrition. *Small Ruminant Research, 51(2), 155-163.*

3. Donato, L., & Guyomarc'h, F. (2009). Formation and properties of the whey protein/κ-casein complexes in heated skim milk - A review. *Dairy Science and Technology, 89(1), 3-29.*

4. Pearce, K. N., & Kinsella, J. E. (1978). Emulsifying properties of proteins: evaluation of a turbidimetric technique. *Journal of Agricultural and Food Chemistry, 26(3), 716-723.*

5. Pesic, M. B., Barac, M. B., Stanojevic, S. P., Ristic, N. M., Macej, O. D., & Vrvic, M. M. (2012). Heat induced casein–whey protein interactions at natural pH of milk: A comparison between caprine and bovine milk. *Small Ruminant Research, 108(1–3), 77-86.*

Acknowledgments: This investigation was supported by the grant of the Ministry of Science and Technological Development of Serbia (Project No. III 46009) **For further information**: *mpesic@agrif.bg.ac.rs*