

INTERACTION BETWEEN MILK PROTEINS AND SOME OF PHENOLIC COMPOUNDS

By

TAMER MOHAMMED ALI EL-MESSERY

B.Sc. Agric. Sc. (Dairy Science), Kafr El Sheikh University, 2002

M. Sc. Agric. Sc. (Dairy science), Cairo University, 2010

**A thesis submitted in partial fulfillment
of
the requirements for the degree of**

DOCTOR OF PHILOSOPHY

in

**Agricultural Science
(Dairy Science & Technology)**

**Department of Food Science
Faculty of Agriculture
Ain Shams University**

2014

Approval Sheet

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This thesis for Ph. D. degree has been approved by:

Dr. NABIL M. MEHANNA

Prof. Emeritus of Dairy Science and Technology, Faculty of
Agriculture, Kafr El Sheikh University

Dr. REZK A. AWAD

Prof. of Dairy Science and Technology, Faculty of Agriculture, Ain
Shams University

Dr. ZAKARIA. M. R. HASSAN

Prof. of Dairy Science and Technology, Faculty of Agriculture, Ain
Shams University

Dr. ALI ABDELAZIZ ALI

Prof. of Dairy Science and Technology and Vice President for Post
Graduate Studies and Research, Ain Shams University

Date of Examination: 24 / 2 / 2014

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Under the supervision of:

Dr. ALI ABDELAZIZ ALI

Prof. of Dairy Science and Technology and vice president for post graduate studies and Research, Ain Shams University (Principal Supervisor).

Dr. ZAKARIA MOHAMED REZK HASSAN

Prof. of Dairy Science and Technology, Department of Food Science, Faculty of Agriculture, Ain Shams University.

Dr. HALA MOHAMED FAKHER EL-DIN

Researcher Prof. Emeritus of Dairy Science, Department of Dairy Science, National Research Center.

Acknowledgement

Firstly of prayerful thanks to Allah who gives me every thing I have. The author would like to express his deepest thanks and gratitude to **Prof. Ali Abd-Elaziz Ali**, Professor of dairy science and technology and vice president for post graduate studies Ain Shams University for his courageous supervision, discussion and correcting the manuscript, valuable guidance and complete co-operation.

Many thanks and gratitude is also extended to **Prof. Zakaria Mohamed Rezk Hassan**, Professor of dairy science and technology, Faculty of Agriculture, Ain Shams University, for his encouragement, suggestion the problem, discussion and correcting the manuscript, continuous valuable suggesting and guidance in preparing this study.

I am grateful to **Prof. Hala Mohamed Faker El-Din**, Professor of dairy science, Department of dairy science, National Research Centre for supervising the whole work, providing facilities, valuable suggestion, moral support, encouragement and plentiful advice. I would have never finished this work without her help.

I am greatly indebted to **Prof. Nayrah Shaker Mehanna**, Professor of dairy science, Department of dairy science, National Research Centre, for her moral support and guidance through revision of the manuscript and her effort provided to achieve this work.

I am greatly indebted to **Prof. Ryszard Amarowicz**, Professor and head of department of chemical and physical properties of food, Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences, Olsztyn; Poland, for his providing experience, chemicals, equipments, the lab to do work and his cooperation throughout this work.

My deep thanks to **Dr. Wael S.I. Abou-Elmagd** Associate Professor of Organic Chemistry, Chemistry Department, Faculty of Science, Ain Shams University, for his true efforts throughout the

laboratory work, plentiful advice and endless efforts provided for me to complete this work.

I would like to express my very special thanks for who supported me all my life and still giving without limits for my mother and my father.

All thanks to my parents, my wife, my daughter (**Alaa**) and my sons (**Abd El-Rahman and Mohamed**) for encouragement and sincere devotion all the time.

ABSTRACT

Tamer Mohammed Ali El-Messey: Interaction between Milk Proteins and Some of Phenolic Compounds. Unpublished Ph.D. Thesis, Department of Food Sciences, Faculty of Agriculture, Ain Shams University, 2014.

Interaction between milk proteins (casein and/or whey protein isolate) and some of standards phenolic compounds (Rosmarinic acid, Chlorogenic acid, Quercetin, Vanillin, Gallic acid, Caffeic acid and Catechin), were determined using Sephadex G-25 column chromatography. Fractions corresponding to protein, protein-phenolic complexes and fractions corresponding to the free phenolics were collected, and their phenolic content was determined by Folin–Ciocalteu reagent. The strongest milk protein-binding affinity was noticed with caffeic acid, whereas chlorogenic acid and vanillin were less interacts with milk proteins. Interaction in the wide range of pH was determined by precipitating potential assay. The optimum pH for the highest interaction was at 3 for rosmarinic acid, quercetin, gallic acid, caffeic acid and catechin, while it was at 5 for chlorogenic acid and vanillin and the lowest interaction for all phenolic compounds was at pH 7.

The interaction between tannin fractions isolated from walnuts (*Juglans regia*), green tea and lentil (*lens culinaris* L.) and acid casein was determined using fluorescence quenching method and tannic acid standard. The interaction between casein and tannic acid had the most extensive fluorescence quenching and followed by walnut > green tea > lentil for plant tannins. Interaction in wide range of pH was determined by precipitating potential assay. The optimum pH for the highest interaction between casein and tannins was at pH 5, while it was at pH 6 for interaction between WPI and tannins

Interaction between tannin fractions from plant source and milk protein fractions [β -casein, κ -casein, β -lactoglobulin (β -Lg) and α -lactoalbumin (α -La)] were determined by high-performance liquid chromatography (HPLC) method with a photo-diode array UV detector.

Photodiode Array Detectors in UV-VIS Spectroscopy: Part

Theoretical aspects of photodiode array detection are presented in this month's INSTRUMENTATION. In next month's issue, the second article in this two-part series will cover photodiode array detection in spectro-electrochemistry, high-performance liquid chromatography, stopped-flow kinetics, and other analytical chemistry applications.

The properties of UV and visible light and the responses of many compounds to these wavelengths have long been considered a useful tool both in identification and in quantitative analysis of compounds. Molecular absorption UV-visible (UV-VIS) spectrophotometry requires detectors with high-UV to near-IR (NIR) response, large dynamic range, linear response, low noise, and temporal as well as thermal stability.

The photodiode array used as a UV-VIS spectrophotometric detector meets these requirements with the added advantage over classical systems of acquiring the entire UV-VIS spectrum simultaneously. Because spectral acquisition is a parallel process, many of the concerns of UV-VIS spectrophotometer users, such as sample photodegradation, scanning nonlinearities, and difficulties in observing transient phenomena, have been minimized if not eliminated.

Conventional UV-VIS spectrometers

Complete UV-VIS spectrophotometric information can be obtained either by scanning across the spectral region of interest or by simultaneously monitoring this region in its entirety. Conventional scanning monochromator systems use a continuous source (deuterium or tungsten lamp) and a dispersive element (a grating or a prism). This dispersive element is mechanically rotated to vary the wavelength of

light passed through the sample. The resulting light is then detected by a photodiode array. Because samples are exposed to narrow wavelength bands, optical information is acquired efficiently and so (Figure 1).

Attempts to use photodiode multiplier tubes have also been accomplished.

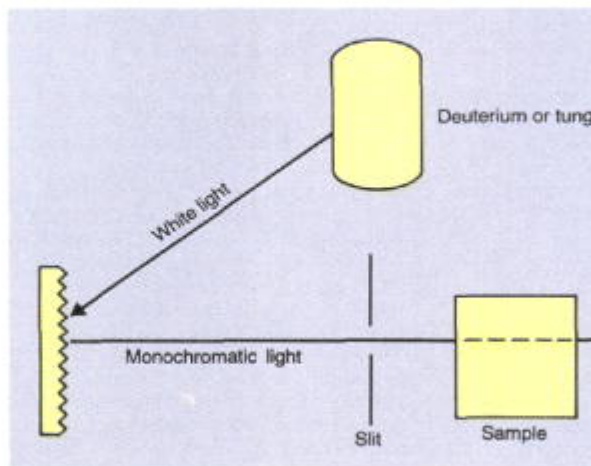


Figure 1. Conventional spectrometer optical configuration

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