Name of Candidate: Ghada Abady Ahmed Ibrahim **Degree:** M.Sc.

Title of Thesis: Effect of Lactulose and the Extracted Native Inulin on the Viability of Some Probiotic Bacteria and Their Uses in the Manufacture of Set Type Yoghurt

Supervisors: Prof. Dr. Elham Mustafa El-sayed
Dr. Sanaa Mohamed Badran
Dr. Ahmed Mohamed Abdel-Salam

Department: Dairy Science

Approval: / /2011

ABSTRACT

The present study aimed to investigate the effect of prebiotics (inulin and lactulose) on the growth and activity of three probiotic bacteria(*L.plantarum* B – 531*, L. casei* B – 444 and *L.rhamnosus* B – 445) as well as yoghurt culture inoculated sparetly or mixed in skim milk. Also to study the effect of incorporating the three tested cultures and the selected prebiotics on the properties and overall acceptability of probiotic and symbiotic yoghurts as well as lactobaclli viability during cold storage. The ratios of probiotic inoculums and prebiotics (0.5 , 1 and 1.5 for probiotic and 1 , 3 and 5 % for prebiotics) were used.

Samples were incubated for 24h at 37° C and 42 ° C, the cell density (OD_{640nm}), lactobacilli count and pH were measured after 4 and 24h of incubation. Some kinetic growth parameters such as specific growth rate (μ/h), mean doubling time (Td/ min) and generation number (gn) were calculated.

The results indicated that the highest cell density, lactobacilli count and the development of acidity were obtained with 1.5% size of inoculum and with 5% prebiotics at 37°C and 42°C. While the highest kinetic growth parameters (μ/h, Td/min, g.n) were associated with 0.5% of inoculum size of single or mixed probiotic cultures with yoghurt culture in presence of the highest dose of prebiotic (5%) at 37°C and 42°C at the end of fermentation. *L.casei* exhibited the highest growth and activity among the other tested cultures either in single culture or mixed with yogurt culture. Using the three probiotic cultures in the manufacture of probiotic yoghurt, resulted yoghurts having living population levels satisfying the international recommendation. The incorporation of probiotic cultures in yoghurt did not affect neither the viability of the starter cultures during cold storage nor the organolaptic properties of yoghurt. Above all probiotic yoghurt containing (Y + Lc) emerged as the best candidate for probiotic yoghurt production mainly because of the highest viability (24.5) and very good sensory properties of the manufactured yoghurt

The results of symbiotic yoghurt (probiotic – prebiotic) using two different fermentation temperatures 37° C and 42 ° C showed that using L.c as probiotics beside yoghurt culture and the supplementation with inulin or lactulose as prebiotic produced symbiotic yoghurt with highest overall acceptability and viability among the other symbiotic yoghurts. Also the fermentation temperature affects the bacterial growth and there by the structure and flavor of product. Moreover the addition of prebiotics enhanced the viscosity, syneresis properties as well as the count of lactobacilli and overall acceptability when compared with these of the control yoghurts. It can be concluded that the symbiotic yoghurts obtained in the present study showed a good properties of symbiotic yoghurt

Key wards: Probiotic,Prebiotic, Lactulose, Inulin,Yoghurt.

Name of Candidate: Marwa Mohamed El-Said **Degree:** M.Sc.
Title of Thesis: Manufacture of Soft Cheese with Multiple Health Benefits.
Supervisors: Dr. Ebtisam Ibrahim Ghita
Dr. Sanaa Mohamed Badran
Dr. Hala Mohamed Fakhr El-Din
Department: Dairy Science **Approval : / /2011**

ABSTRACT

This study is an endeavor to elevate the health benefits of the soft cheese. Therefore, low fat soft cheese was manufactured by using the retentate results from UF-skim milk, adding some natural antioxidants such as parsley and green pepper as carotenoids sources, rosemary and thyme as phenols sources. Effect of some technological aspects such as heating, salting and renneting on the antioxidant activity of the supplemented retentates was studied by estimating total carotenoids, total phenols, RSA% and FRAP values. Also, the antioxidant activity, chemical composition and organoleptic properties of the resultant cheese along storage in the refrigerator for 30 days were evaluated. The results revealed that the technological processes had no great effect on the antioxidant activity of the supplemented retentate. Heat treatment increased and both salting and renneting slightly decreased the antioxidant activity. Storage period also slightly decreased the antioxidant activity of the supplemented cheese. Generally, it could be manufacture low fat soft cheese by using low fat retentate and adding natural antioxidants to obtain highly acceptable cheese with more health benefits.

Key words: natural antioxidant, low fat soft cheese, antioxidant activity, carotenoids, phenols.

Name of Candidate: Hany Abdel Satar Ahmed Elkashef
Degree: M.Sc.
Title of Thesis: Properties, preservation and evaluation of buffaloes' and cows' colostrum.
Supervisors: Dr. Alaa Mohamed Abd El-Fattah
Dr. Fawzia Hassan Ragab Abd Rabo
Department: Dairy Science
Approval: 12 / 12 / 2011

ABSTRACT

This study was designed to follow the changes in properties of Egyptian buffalo and Holstein cow colostrum after parturition, select the proper heat treatment of buffalo and cow colostrum that would produce no significant changes in viscosity and IgG concentration, compare between freezing and freeze-drying methods for colostrum preservation and evaluate the safety of long-term consumption of Egyptian buffalo or Holstein cow colostrum on young Wistar rats.

The obtained results illustrated that at calving, buffalo colostrum was characterized by significantly higher fat, lactose, ash, total solids, phosphorus, vitamin E, Val, Met, Ile, Phe, His, Lys, Asp, Pro, Cys, Tyr and IGF-1 as well as viscosity; and significantly lower Mg, Na, K, Zn, vitamin A, Ser, Glu, Gly, Ala, Arg and lactoferrin concentrations compared to cow colostrum. Also, data obtained showed that as the lactation period advanced, the levels of total protein, whey proteins, fat, ash, total solids, bioactive components (IgG, IgM, IGF-1 and lactoferrin), specific gravity, viscosity and titratable acidity in both colostrums decreased and those of lactose and pH conversely increased. As for essential and non-essential amino acids, macro- and micro elements, and vitamins A and E, data obtained showed some significant and non-significant changes in both colostrums during the first 5 days and after 14 days of parturition. Comparing with cow milk, buffalo milk had significantly higher fat, total solids, Ca, Mg, vitamin E, Ile, Phe, His, Lys, Cys, Tyr; and significantly lower Na, P, Cu, Zn, vitamin A, Leu, Asp, Gly and Ala concentrations on the fifth day of parturition.

Heat treatment of buffalo and cow colostrum at 60°C/60 min could be sufficient to eliminate pathogens (*Staphylococcus aureus*, *Salmonella spp*. and *Escherichia coli)* and maintained colostral IgG and fluid characteristics. Freeze-drying had no effect on the colostrum bioactive substances. The bioactive substances of frozen or freeze-dried colostrum decreased gradually during the six months of storage. The greatest influence of the storage was found on the concentration of IgM.

The present study revealed that at the end of the experimental period (90 days), there was no difference between buffalo or cow colostrum-fed animals at dose of 0.5 ml /100g body weight of rat and the control group in clinical signs, hematology, most parameters of blood chemistry (carbohydrate metabolism, liver and kidney functions) and histological structure of liver, kidney and duodenum.

Key words: Buffaloes, cows, colostrum, chemical properties, quality, preservation, safety.

Name of Candidate: Lamiaa Foad Abd El-Hameed
Title of Thesis: Studies on some fermented milk products.
Supervisors: Dr. Fatma Mohamed Mahmoud Salama
Dr. Sanaa Mohamed Badran
Dr. Eissa Abd El-Ghafar Emara
Department: Dairy Science.
Branch: **Approval:** 1 / 10 / 2011

ABSTRACT

Low fat stirred biogarde was made from standardized buffaloe's milk (1.5% fat) with different levels of Simplesse ® 100 or Slendid 200 (0.2, 0.3, 0.4 and 0.5%). Two control stirred biogardes were made from buffaloe's milk 5.5 and 1.5% fat. From the obtained results it can be concluded that probiotic fermented milk (stirred biogarde) can be successfully made from buffaloe's milk 1.5% fat with 0.3% Slendid 200 or 0.4% Simplesse ® 100 and using ABT culture.

Low fat stirred biogarde was made from buffaloe´s milk 1.5% fat supplemented by 0.3% Slendid 200 (the highest score in the first part) then sweetened with honey, dibis or molasses. These sweeteners were added after fermentation by a ratio of 8% individually or in a combination of honey: dibis: molasses 1: 1: 1 portions. The four treatments were compared with control stirred biogarde (without sweeteners) and with the treatments (T_1) stirred biogarde sweetened with 7% sucrose. The obtained results indicated possibility of using dibis in the flavoured stirred biogarde to improve the properties of the product.

Three different methods (heat shock at two different temperatures and time 73 ºC/20 sec and 65 ºC/15 min or freeze shock at -11 ºC /5 hours or heat in microwave oven at 73 ºC/60 sec) were implemented to study their effect on extending the shelf life of low fat yoghurt. In general, the post fermentation treatment (heat or cold shock) increased the shelf-life of low fat stirred yoghurt which was extended to 28 days at cold storage in treated samples compared to 16 days in control samples. The sensory evaluation revealed that at the end of storage period the highest score was observed in freeze shocked samples followed by microwave – heated samples.

Key words: biogarde, Simplesse ® 100, Slendid 200, sucrose, honey, dibis, molasses, yoghurt, heat shock, freeze shock, microwave.

Name of Candidate: Ahmed Mohammed Hamed **Degree:** M.Sc.

Title of Thesis: Studies on Levels of Some Heavy Metals and Polychlorinated Biphenyls (PCBs) in Milk and Milk Products

Supervisors: Dr. Elham Mustafa El Sayed
Dr. Sanaa Mohammed Badran
Dr. Amr Ahmed Mostafa

Department: Dairy Science

Approval: 9/ 7 /2011

ABSTRACT

This study was conducted to determine some contaminants in milk such as heavy metals (Cd, Pb, Fe, Zn, Cu and Cr) and, PCBs (28, 52, 101, 138, 153 and 180), in milk and milk products. Survey in seven different Egyptian regions and during 3 seasons of one year (2009) was carried out. The effect of manufacturing process of some dairy products (fresh cheese, Ras cheese, yoghurt and fatty products) on levels of these contaminants was also studied.

According to the results obtained it could be concluded that:

The most polluted samples were obtained from Shubra. As regards to seasonal variation Cd, Zn, and Cr showed the highest levels of pollution in Jan. – Feb. season, while Pb, Fe and Cu showed the highest pollution in May- June, the most polluted season is May – June.

Referring to dairy products the results obtained recorded about 70-80 % reduction in heavy metals concentration in cheese as compared to that of raw milk. Ras cheese displayed the highest reduction. Concerning yoghurt, the results indicated that levels of studied metals were lower than that of the levels in raw milk by 0,50, 17.04, 15.3, 11 and 10.6 % for Pb, Cd, Fe, Cr, Cu and Zn, respectively. For fatty product ghee has the lower retention of heavy metals (0-4%).Regarding, the survey of PCBs it can be concluded that :

The most contaminated region by PCBs is Menofia (10ng/ g fat), and May – June was the highest polluted period. Concerning to processed dairy products the obtained results showed that:

Using UF – technique lead to reduction of ∑PCBs. And all congeners concentration as well as sum of all ∑PCBs were decreased gradually till the end of ripening period of Ras cheese. Some congeners are degraded by microbial process in yoghurt manufacture .Congeners PCB 138, 153 and 180 were the most abundant in all fatty products samples.

In conclusion , its worthy to note that non of the evaluated milk products samples in the present study exceeded the maximum level set by European community (100 ng/ g fat).

Key words: Milk Products, Heavy metals, PCBs, ICP, Seasonal variation

Name of Candidate: Zeinab Farouk Abd El-Salam **Degree:** M.Sc.
Title of Thesis: Studies on Improving Quality of Low Fat Ras Cheese
Supervisors: Dr. Soad Hassan Taha
Dr. Fatma Ali Metwally
Dr. Samia Ibrahim Harby
Department: Dairy Science **Approval:** / /2011

ABSTRACT

Low fat foods including milk and milk products have an important role for consumers having healthy problems or nutrition disorders; on the other hand removal or reducing fat levels adversely affect the flavor and texture of low fat dairy products. Ras cheese is the most famous and favorable hard cheese in Egypt, so this study was designed to improve the quality of low fat Ras cheese. The study included the effect of using partial homogenization, 0.3% emulsifiers and 0.1% emulsifying salts on the chemical, microbiological properties and sensory attributes of low fat Ras cheese. In addition to the effect of using 1% of probiotic bacteria (*L. gasseri, L. johnsonii*) with yoghurt culture either in a single or mixed culture in addition to the effect of using 0.5% of kefir or 1% of aroma cultures on the quality of low fat Ras cheese. Results indicated that using partial homogenized milk, 1% of probiotic bacteria with yoghurt culture or 0.5% of kefir culture improved flavor and texture (sensory attributes), and increased the contents of S.N. /T.N. and T.V.F.F.A. of low fat Ras cheese. Results also showed that cheese made from a combination of partial homogenization, probiotic bacteria or kefir culture gained higher scores of sensory evaluation and the counts of probiotic bacteria were in accordance with the recommended counts to get the healthy beneficial effect compared to control cheeses.

Key words: low fat Ras cheese, partial homogenization, probiotic bacteria, aroma starter culture.

Name of Candidate: Sally Samir Gaber Ahmed Sakr **Degree:** Ph.D.
Title of Thesis: The Physicochemical, Immunological and Technological Changes of Milk Induced by microbial transglutaminase
Supervisors: Dr. Fawzia Hassan Ragab Abd-Rabo
Dr. Samia Mahmoud El-Dieb
Department: Dairy science
Branch: …… **Approval: / / 2011**

ABSTRACT

In this study the natural state changes of cows' and buffaloes' milk proteins induced by microbial transglutaminase (MTGase), the reduction of milk proteins allergenicity caused by utilization of modified skim cows' and buffaloes' milk and the chemical, physical and sensory characteristics of set-style yoghurt manufactured from less allergic modified skim and whole cows' milk were followed. The obtained results revealed that the treatment of milk by MTGase led to:

- completely incorporation of glutamine and arginine in skim cows' milk, while glysine and valine were in skim buffaloes' milk.
- reduction in levels of monomeric caseins.
- significant increase in the level of hydration of the cross-linking protein polymer, viscosity and a decrease in the level of sedimentable solids.
- the allergic changes in small intestine of orally sensitized Balb/c mice groups were less than the native milk sensitized groups.
- the intestine villi of orally sensitized mice appeared long and fine, the crypt/villi ratio was intact, less edema and architectonic disarray.
- serum immunoglobulin E (IgE), immunoglobulin G (IgG) and plasma histamine levels were lowered.
- the addition of MTGase to yoghurt milk had no effect on the fermentation time of yoghurt.
- yoghurt made from MTGase milk had less syneresis, high capacity for holding water and a greater viscosity than control.
- yoghurt made from MTGase treated skim cows' milk had lower level of acetaldehyde than control.
- the results of sensory analysis showed that, it was possible to reduce the fat content and the obtained yoghurt was similar in texture to the full-fat yoghurt.
- yoghurt made from skim or whole milk pre-incubated with MTGase had the highest total scores between treatments.

Key words: cows' milk, buffaloes' milk, transglutaminase, allergy, yoghurt

Name of Candidate: Awad Abd El-Rahman Awad **Degree:** Ph.D.
Title of Thesis: Influence of transglutaminase on activity of some lactic acid bacteria strains and properties of cereal-rich fermented dairy beverage
Supervisors: Dr. Abd El-Rahman Abd El-Atti Ali
Dr. Mohamed Ahmed Abd El-khalEk Azzam
Department: Dairy Science
Branch: ----- **Approval: 10 /7/2011**

ABSTRACT

The aims of this study were to: a) develop a new fat free probiotic fermented dairy product rich with health barley components, b) improving of its therapeutic, functional, physical, structure and keeping quality properties. Three products were made from cows´ skim milk supplemented with 10% sucrose and 4-6% barley flour then fermented with one of three probiotic cultures tested (*L. acidophilus* NCDC-14, *L. casei* NCDC-279 and *L. rhamnosus* NCDC-18). The best product was optimized then improved by microbial transglutaminase (mTG). Results indicated that maximum counts of *L. acidophilus* (log_{10} 8.2 cfu/ml) and *L. rhamnosus* (log_{10} 9.02 cfu/ml) were obtained in the products contained 5% barley flour and 1.5% inoculum, while that of *L. casei* (log_{10} 9.88 cfu/ml) was found with 6% barley flour and 2% inoculum. Constant inoculum volume (1.5%) with different barley flour produced the highest flavor, consistency and overall acceptability scores. Barley flour and inoculum levels were optimized to prepare the best product, which had 4% and 1.41% for *L. acidophilus*, 4.46% and 1.44% for *L. casei* and 4.5% and 1.31% for *L. rhamnosus*, respectively. The product prepared by *L. acidophilus* NCDC-14 had the greatest sensory attributes with highest acidity (0.76%) and lowest pH value (4.25) and chosen for improving and shelf-life evaluation. Microbial TG improved yield, physical and microstructure properties of the *L. acidophilus* products. Viable cells counts were relatively stable and remained above 10^8 cfu/ml throughout 10 days cold storage (5°C). Mouthfeel, consistency and overall acceptability scores of M2 (mTG inactivated before fermentation) samples and yield of that samples (M2-mTG) and M1 (mTG added simultaneously with culture) samples were increased by cold storage progress.

Key words: barley flour, probiotic culture, mTG, microstructure, physical properties, sensory attributes.

Name of Candidate: Khalid Abdullah Saleh Al-Rubayyi **Degree:** Ph.D.
Title of Thesis: Isolation and Characterization of The Dominant Lactic Acid Bacteria in The Traditional Egyptian Rayeb Milk and Their Use in The Manufacture of Stirred Yoghurt
Supervisors: Dr. Ibrahim Abd El Salam Abd El Gawad
Dr. Alaa Mohamed Abd El-Fattah
Department: Dairy Science
Approval: 2 / 3 / 2011

ABSTRACT

The aim of this study was to:1- characterize and identify dominant lactic acid bacteria (LAB) that occur naturally in the Egyptian traditional rayeb milk by using both physiological and biochemical methods to determine their technological properties . 2- improve the properties of the stirred yoghurt particularly the physical properties throughout using the selected isolated strains, incubation temperature and stabilizer.

The results achieved could be summarized as follows:

A total of 170 isolates were isolated from 40 traditional rayeb milk samples collected from different areas in Egypt. The LAB dominated the microbial population of rayeb milk and were identified on basis of their morphological, physiological and biochemical (API) characteristics. Among the isolates, the Lactobacilli were dominant. The distribution of the isolates by genus was as fallows: Lactobacilli (30%), Leuconostoc (26%), Enterococcus (20%), Streptococcus (18%) and Aerococcus (6%). Thirty eight representative LAB strains were identified to species level belonging to species *Str. thermophilus*, *L. bulgaricus*, *L. helviticus*, *L .acidophilus*, *L. delbuerkii*, *Leu. cremoris*, *Ent. faecium*, *Str. durans*, *Str. acidomonas* and *Aer. viridans*. The identified strains were then evaluated for some technological properties. Most strains of lactobacilli produced EPS and two strains only of those had antagonistic properties against *E. coli* and *S. aureus*.

Four isolated strains were chosen to manufacture the stirred yoghurt according to their acid production, EPS production and antibacrerial ability. Two different starters were formulated from these four strains. The first starter consisted of *L.bulgaricus4*, *S.thermophilus1* and *Leu.cremoris2*, while the second starter consisted of *L.bulgaricus4*, *S.thermophilus1*, *Leu.cremoris2* and *L.acidophilus1*. Titratable acidity% of all stirred yoghurt samples was increased while, pH values were decreased by extending the refrigerated storage period. Yoghurt samples made by starter-2 exhibited the highest content of lactic acid. Acetaldehyde percentage of all yoghurt samples was significantly increased by various starter strains ($P<0.001$), incubation temperature ($P<0.001$) and storage prolongation ($P<0.001$) reaching the maximum at the end of storage period. Viscosity values of yoghurt samples resulting from using each culture strains were increased during the first 15 days of storage then decreased. It can be also noticed that the yoghurt samples exhibited the highest viscosity values throughout refrigerated storage period, when inoculated milk was incubated at 30 ºC. Yoghurt samples which exhibited the highest viscosity value had the lowest syneresis value. Transmission electron microscopy revealed that the yoghurt samples made by starter-1 and starter-2 with 0.4% stabilizer appeared to have a more compact structure, particularly when their yoghurt milks were incubated at 30ºC. Yoghurt samples made using starter-2 and 0.4% stabilizer gained the highest organoleptic score (89.7) as compared with the control and other samples.

Keywords: Stirred yoghurt – Isolation and identification lactic acid bacteria – Rayeb milk

Name of Candidate: Mahmoud Abdel-Hamid Mohamed
Degree: Ph.D.
Title of Thesis: Studies on the Biological Actions of Some Nitrogenous Whey Products
Supervisors: Dr. Soad Hassan Taha
Dr. Abdel-Gawad Imam Abou-Dawoud
Dr. Mahmoud Zaki Sitohy
Department: Dairy Science
Branch: --- **Approval:** 1 /1 / 2011

ABSTRACT

This study was conducted to investigate the biological actions of some nitrogenous whey products namely, whey protein isolate, whey protein hydrolysate, α-lactalbumin, β-lactoglobulin, lactoferrin and glycomacropeptide.

Experiments were carried out to: i) study antiviral activity of native and esterified whey protein fractions against tomato yellow leaf curl virus (TYLCV) and influenza A virus subtype H5N1; ii) study the hepatoprotective effect of whey protein products against liver steatosis in rats.

The obtained results indicated that the antiviral activity of the used whey protein fractions against TYLCV can be arranged in a descending order as follows: lactoferrin (native or modified form) > native α-lactalbumin > modified β-lactoglobulin > modified α-lactalbumin = native β- lactoglobulin.

Esterification of whey protein fractions has further enhanced their antiviral activity against H5N1 in a concentration dependent manner. In response to protein concentration going from 20 to 80 µg/ml, Met-α-LA was the lowest active antiviral protein, while both Met-BLG and Met-LF reached the maximum antiviral influence when the protein concentration was 80µg/ml.

Rat feeding experiments revealed that oral administration of whey protein products reduced the level of aspartate&alanine aminotransferase (ALT& AST) and the level of malondialdehyde in liver, increased the level of liver glutathione and enhanced liver histology comparing with the infected control.

Key words: Whey proteins, esterification, H5N1, TYLCV, steatosis