Dairy Foods: Cheese II

537 ADSA Pioneer: White cheese development. R. Richter*, *Texas A&M University*, *College Station*.

White cheeses are universally accepted and are a major component of the diet in many cultures. They are manufactured in many cultures and have a wide variety of names but many are similar in texture and flavor. Most of the white cheese varieties are manufactured by rennet coagulation of the milk with little or no acid production in the process. A popular variation is the production of cheeses that melt and stretch. A rich Artisan background for the manufacture of these cheese varieties exists and provides a significant basis for the development of this cheese category. The high pH and high moisture content of many of the white cheese products have caused vigilance for the manufacturing and storage practices to prevent public health problems. Research of these cheeses in the United States has historically been minimal but interest in this area has increased with the changing demographics in the United States and the expansion of the market.

Key Words: Cheese

538 Impact of the type of milk protein used to prepare starter media on properties of Mozzarella cheese. S. Govindasamy Lucey*, B. Dosti, J. Jaeggi, M. Johnson, and J. Lucey, *University of Wisconsin*, *Madison*.

Reconstituted NDM is commonly used as bulk starter culture medium in cheesemaking although whey protein concentrate (WPC) or milk protein concentrate (MPC) are other possible milk proteins that could be used. We investigated the impact of using WPC34/NDM blend or MPC80 based starter media for the manufacture of Mozzarella cheese. Cheesemilks were produced by blending skim milk (fortified with 1.5% NDM) (10.5% TS, 2.9% casein, 0.7% fat), cream (42.7% TS, 1.5% casein, 36.8% fat). 3% (w/w) starter media made with MPC80 (0.2% fat, 7.8% casein, 10.3% TS) or a blend of 16.3% WPC34 and 3.8% NDM (0.5% fat, 5.5% casein, 19.6% TS) was also added. No bulk starter media was added to control cheesemilk. All cheesemilks were standardized to a similar casein:fat of 1.0. A direct-vat-set starter culture was added to cheesemilks. Three types of cheeses were produced; control and cheeses made with WPC34/NDM and MPC80. Cheese functionality was assessed using dynamic low-amplitude oscillatory rheology (DLAOR) and performance on pizza. Coagula were cut at the same firmness. Addition of WPC34/NDM or MPC80 based starter media resulted in shorter rennet coagulation time. Cheeses made with both types of bulk starter media had slightly higher moisture contents (46.4-46.8%) compared with control (45.7%) cheeses. Nitrogen and fat recoveries were highest in MPC80-fortified cheese compared to control or WPC34/NDM-fortified cheese. Moisture-adjusted cheese yield was significantly higher in cheeses fortified with bulk starter media. Maximum loss tangent (LTmax) values (meltability index from DLAOR) was significantly lower in WPC34/NDM-fortified cheese compared to control or MPC80-fortified cheeses and LTmax values increased during the first two wk of ripening, after which the LTmax decreased. Temperature of LTmax was similar in all three cheeses and decreased with age. TCA-soluble nitrogen levels were higher in cheeses made with bulk starter media compared to control. Performance on pizza was similar for all cheeses. The results of this study indicated that other types of milk protein powders can be successfully used as starter media in cheesemaking.

Key Words: Cheese Yield, Starter Media, Functionality

539 Characterization of Sicilian Pecorino cheese by area of production. S. Carpino*[1], I. Schadt[1], S. La Terra[1], G. Belvedere[1], T. Rapisarda[1], and G. Licitra[1,2], [1]*CoRFiLaC, Regione Siciliana*, *Ragusa, Italy*, [2]*D.A.C.P.A., Catania University*, *Catania, Italy*.

Pecorino Siciliano is a PDO ewes' milk cheese produced in Sicily. The aim of this study was to investigate aroma profile differences for traditional Pecorino Siciliano cheeses produced in different part of Sicily. Cheeses ripened at 2, 4 and 8 months were obtained from 21 farms, from throughout Sicily, that were classed into seven areas by geography: Iblean (A), Etnea (B), South-center (C), North-center (D), Western (E), West-center (F), Peloritana (G). Botanical composition of the native pasture grazed were visually evaluated in all these involved farms. Traditional cheese making parameters were also detected and evaluated. A MS-based Electronic Nose (SMartNose) was used to detect organic volatiles components in the mass-to-charge (m/z) range of 10 to 160 amu. Results were statistically elaborated by Principal Components Analysis (PCA). Comparison of the cheeses at 2, 4 and 8 months of ripening, generally showed differences in volatile compounds among the different areas. Cheese samples at 2, 4 and 8 months of ripening showed marked differences, likely due to the increasing lipolytic and proteolytic processes releasing the aroma compounds that characterize the cheese with time. The 8 month cheeses, showed the best separation with PC1 (60%) and PC2 (22%). Comparing two areas per times all the areas showed a good separation, but no differences between the Iblean area (A) versus the South-center area (C) and the Iblean area (A) versus the North-center area (D) were detected, indicating that seven areas are probably too many and we might need to restrict it. These comparison were also related to both differences in botanical composition and cheese making parameters in order to define which kind of parameters might effect Pecorino Siciliano cheese volatile profiles linked to the area of production.

Key Words: Cheese, SMartNose, Volatile Compounds

540 Effect of brine composition on cheese physical properties in Ragusano cheese. N. Fucà*[1], L. Tuminello[2], S. La Terra[2], M. Caccamo[2], M. Manenti[2], G. Licitra[1,2], and D. J. McMahon[3], [1]*D.A.C.P.A., Catania University*, *Catania, Italy*, [2]*CoRFiLaC, Regione Siciliana*, *Ragusa, Italy*, [3]*Utah State University*, *Logan*.

During cheese brining, brine temperature, salt and calcium concentration influence the composition as well as the physical properties of cheese. This study aimed to examine the influence of brine composition and temperature on the protein matrix structure in cheese and its role in salt uptake. Three experimental 3.4-kg blocks of Ragusano cheese were made. The cheeses were cut in 63 pieces ($1.7\times1.8\times13$ cm^3). One piece from each was chemically analyzed at time 0. All other pieces were measured for weight and volume and then immersed in 4 different

brine solutions (2, 10, 18, and 26% salt; all with 0.1% Ca) at 3 different temperatures (4, 12, and 20°C). The 10%-salt treatment was also performed with brine calcium contents of 0, 0.1, 0.2, and 0.4% Ca. After 24 h brining, the cheese was analyzed for weight, volume, fat, moisture, protein, salt, and Ca content, and by scanning electron microscopy. Cheeses brined in 2 and 10% salt had an average increase in weight (20.5 ±0.06% and 7.3 ±0.05%, respectively) while the 18 and 26%-brined cheeses decreased in weight (-7.9 ±0.04% and -15.2 ±0.04%). Similar changes occurred in volume and cheese protein matrix appeared to be more expanded with low salt concentration and more compact with high salt concentrations. Brining at 4 and 12 °C caused greater expansion when the salt concentration was ≤ 10%. At 20 °C, virtually no change in volume occurred in 10%-salt brined cheeses indicating that even though salt was absorbed (salt content after 24 h was 4.9%) there was virtually no change in the protein matrix. When cheeses were brined without added calcium there was an increase in cheese volume (15.1 ±0.09%) and weight (18.6 ±0.03%) at all temperatures. At high calcium levels (0.4%), syneresis occurred and there was a decrease in volume (-7.2 ± 0.08%), especially at 20 °C (-16.5%).

Key Words: Cheese, Calcium, Microstructure

541 Studies on various paneer based spreads. H. A. Kumar and H. G. R. Rao*, *Dairy Science College, KVAFSU, Hebbal*, *Bangalore, Karnataka, India*.

Paneer is a heat-acid coagulated Indian type of soft cheese, used mainly for making culinary dishes. Paneer was made by heating wholemilk to 90°C, cooled to 70-75°C and coagulated by addition of 1percent citric acid. The whey was then drained out through a stainless steel mesh to obtain paneer curd. Paneer spread (control) was prepared by adding salt (1.5%) and stabilizer (0.5%) to paneer curd and mixture was subjected to grinding by using mixer-grinder.

Dairy spreads available in the world market are high in fat, saturated fatty acids and cholesterol. Hence an attempt has been made in this study to develop various types of paneer based spreads which are low in fat and cholesterol, besides having good spreadability. Incorporation of 10%WPC or 5 % sodium caseinate or 5% soy flour in product preparation resulted in higher yield, better functional (firmness, spreadability, stickiness and adhesiveness were determined by texture analyzer) and nutritional value (considering protein %) comparable to control. Replacement of milk fat with vegetable oils (soy, corn or sunflower) at 25% level was highly acceptable with improved body and texture (texture analyzer) and spreadability. Further, matured cheddar cheese was incorporated at 30% level to paneer curd along with tri-sodium citrate (0.5%) as stabilizer and salt (1.5%). The mixture of cheese, paneer curd, stabilizer and salt was blended and grounded to obtain paneer spread. Incorporation of matured cheddar cheese in paneer spread improved acceptability and received higher flavor scores than control. Incorporation of spices such as pepper, clove, cinnamon and their combinations in the form of powder at 1% resulted in better flavor scores. Pepper and mixture of pepper and clove-flavored paneer spreads recorded highest overall acceptance scores. Among various storage studies undertaken, mere vacuum treatment of paneer spreads resulted in extension of storage up to 35 days at 7°C, as against 14 days in control. Microwave treatment of spreads under similar conditions of temperature resulted in extension of keeping quality up to 63 days. Cheese spreads are not popular in India. Therefore paneer type of product with slight modifications with better functionality to improve their utilization was developed in this study.

Key Words: Paneer, Spreads, Spices