AN ABSTRACT OF THE THESIS OF

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A focus group interview consisting of 25 international Taiwanese students and a consumer survey in which 793 native Taiwanese urbanites participated were conducted. Both studies investigated the purchasing and consumption behaviors, attitudes, opinions and expectations of Taiwanese people toward cheese. The focus group results provided good predictions and explanations of survey findings. Consuming fast foods introduced cheese to Asians. However, cheese may not be the main reason to consume fast foods. Cheese was considered as an ingredient in foods. Consuming cheese at a restaurant was more frequent than at home. Cheese sandwiches, fast foods, au gratin foods, cheesecake and spaghetti were popularly consumed at restaurants. Home consumption frequency of cheese was less than once a month. Subjects whose parents and elders do not accept cheese, were not knowledgeable about cheese. Chinese culture influenced subjects' attitudes and

behaviors relating to cheese. First, cheese was consumed in a hot and melted form. Then, small packages of cheese were purchased for home use. Finally, subjects were willing to try new Chinese foods specially developed for cheese. Sensory, visual and marketing factors influenced decision-making of cheese purchasing. Strong product characteristics affecting cheese purchasing were price (moderate), health concerns (low in fat and cholesterol and high in calcium) and form (sliced cheese individually wrapped with plastic film). The important sensory expectations of cheese were the presence of stringiness (appearance and texture), creaminess (aroma), softness, fineness, melted in hands, and smoothness (texture), and milkiness and buttery (flavor) and the absence of oiliness (appearance and flavor), stickiness (appearance) and bitter and sour aftertaste (flavor). Finally, several suggestions to U.S. cheese industries were offered in order to help them establish a successful export market in the integrated Chinese marketplace, the market with the most potential in Pacific Rim Asia.

# Purchasing and Consumption Behaviors, Attitudes, Opinions and Expectations of Taiwanese Urbanites toward Cheese

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# PURCHASING AND CONSUMPTION BEHAVIORS, ATTITUDES, OPINIONS AND EXPECTATIONS OF TAIWANESE URBANITES TOWARD CHEESE

## I. INTRODUCTION

Pacific Rim Asia is the most important cheese import market in the world (FAO 1999) although cheese is not a traditional Asian food (Griffin 1999). Cheese imports grew 195% in Japan and 322% in the rest of Pacific Rim Asia from 1987 to 1995 (Sørensen 1997). Cheese has gained popularity and acceptance due to population and economic growth (FAO 1999; Nubern 1999; Olscheske 1990). Successful fast food business in this region is recognized as introducing cheese to Asian consumers (Griffin 1999). However, Asians' consumption behaviors and attitudes toward cheese remain obscure and have hardly been investigated. Furthermore, U.S. cheese companies have not benefited from this market. European Union, New Zealand and Australia are major suppliers (ADC 2001, 2002; DG-AGRI-EC 2001; FAS-USDA 2000, 2001; NZDB 2001).

The goal of this study was to obtain useful consumer information about cheese to successfully expand the U.S. export market in Pacific Rim Asia. The Chinese

integrated market place, including mainland China, Hong Kong and Taiwan, was first targeted because the largest ethnic group in the world is Chinese. Also, China and Taiwan joined the World Trade Organization (WTO) in December 2001 and January 2002, respectively (WTO 2001a, 2001b). China is expected to be the biggest import market for U.S. cheese (USDA 2000). Import and consumption patterns of dairy products in Taiwan have been shown to indicate future trends in China (Zhou and Novakovic 1996).

The objectives of the thesis were

1) to understand Taiwanese consumers' cheese consumption behaviors at home and at restaurants,

2) to determine opinions regarding the product characteristics influencing the decision-making when cheese is purchased,

3) to explore attitudes toward cheese consumption and fast foods and

4) to discover sensory and non-sensory expectations of cheese.

The first study employed a focus group to qualitatively collect preliminary and background information related to the research of interest. Twenty-five Taiwanese international students currently residing in the U.S. for a limited time were chosen and interviewed. The second study was a survey conducted in Taiwan in order to quantitatively gather information related to the thesis objectives. The design of survey questionnaires was based on results from the first study. Drop-off

interviewing technique was used to prevent the problem caused by low responses (Salant and Dillman 1994). 793 Taiwanese residents who were living in big cities (Taipei or Taichung), were between 16 to 40 years old, and had experienced cheese within a year, participated. Much information was gathered and suggestions to U.S. cheese manufactures were finally made. However, further sensory panels (descriptive and consumer tests) need to be conducted in order to understand local tastes in cheese.

# II. LITERATURE REVIEW

## CHEESE TRADE AND CONSUMPTION IN THE PACIFIC RIM REGION

### Cheese import of and export to Pacific Rim Asia

Even though cheese is not a traditional Asian food, its consumption in Pacific Rim Asia has increased drastically in the past 20 years (Anonymous 1999a; Asia Cuisine 2001; Etesse 1998; Griffin 1999; Oldwayspt.org 2001; Ruff 1996; Sørensen 1997). This region is also known as the most densely populated area in the world, leaving little available land to allow for the development of livestock industries (Bruem 2001; Rae 1997). While the demand of cheese increases, its supply depends on imports. As a result, this region has become one of the two most important cheese import markets in the world, the other one being Latin America (FAO 1999). Imported cheese had an 11% share of total dairy imports in Pacific Rim Asia. This was composed of 8% natural cheese, 2% fresh cheese and 1% processed cheese (Asia-dairy.com 2001). The amount of cheese imported to this region (excluding Japan) increased from 18,000 metric tons (MT) in 1987 to 58,000 MT in 1995, representing a growth of about 322%. The growth of cheese import to Japan also increased by 175% from 1987 to 1995 (Sørensen 1997) and by 128% from 1996 to 2001 (FAS-USDA 2001). The Japanese consume the largest

amount of cheese in this region, followed by South Koreans. In 2001, annual total consumption in Japan increased to 24,500 MT. However, Japanese's per capita consumption was still far below the countries with similar income levels (FAS-USDA 2001). Therefore, the import cheese market in Pacific Rim Asia is full of potential.

The European Union, Australia, New Zealand, and the U.S. are the major cheese suppliers to the world market (Sørensen 1997). The European Union is the largest cheese supplier with over half of the export market. Its major market was within Europe (both EU and non-EU countries), the Former Soviet Union, the Middle East, North Africa, and Japan (DG-AGRI-EC 2001; FAS-USDA 2001; Sørensen 1997). However, it gradually lost its market share to non-subsidizing countries because it was constrained by the World Trade Organization's (WTO) Uruguay Round Agreement to reduce subsidized exports. Its market share fell from 60% in 1992 to 40% in 1997 (FAO 1999; Griffin 1999).

Two Oceania countries, New Zealand and Australia, benefited from this WTO agreement. Their cheese exports increased drastically after 1995 (Table 2.1). The low cheese price (due to the high milk yield and low production cost), geographic proximity to Asia and aggressive marketing strategies made them highly competitive with other cheese producing countries (DG-AGRI-EC 2001; FAO 1999; FAS-USDA 2000). The price of New Zealand and Australian cheese

Table 2.1. Cheese exports in selected countries (unit: 1,000 metric tons).

| COUNTRY | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| NORTH AMERICA | | | | | | |
| Canada | 15 | 23 | 27 | 25 | 18 | 25 |
| Mexico | 0 | 0 | 0 | 0 | 0 | 0 |
| United States | 32 | 38 | 37 | 38 | 47 | 45 |
| Sub total | 47 | 60 | 64 | 63 | 65 | 70 |
| SOUTH AMERICA | | | | | | |
| Argentina | 11 | 19 | 17 | 20 | 24 | 18 |
| Brazil | 0 | 0 | 0 | 0 | 0 | 0 |
| Venezuela | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub total | 11 | 19 | 17 | 20 | 24 | 18 |
| EUROPEAN UNION | | | | | | |
| Denmark | 85 | 84 | 73 | 68 | 72 | 73 |
| France | 112 | 96 | 99 | 96 | 97 | 100 |
| Germany | 113 | 135 | 93 | 61 | 90 | 80 |
| Ireland | 7 | 4 | 4 | 5 | 8 | 8 |
| Italy | 42 | 45 | 48 | 53 | 55 | 55 |
| Netherlands | 101 | 87 | 67 | 60 | 79 | 60 |
| Spain | 4 | 3 | 3 | 2 | 3 | 4 |
| Sweden | 2 | 3 | 2 | 2 | 4 | 4 |
| United Kingdom | 19 | 10 | 10 | 13 | 18 | 15 |
| Sub total | 485 | 467 | 399 | 360 | 426 | 399 |
| EASTERN EUROPE | | | | | | |
| Poland | 14 | 16 | 17 | 12 | 7 | 10 |
| Romania | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub total | 14 | 16 | 17 | 12 | 7 | 10 |
| FORMER SOVIET UNION | | | | | | |
| Russia | 3 | 3 | 3 | 3 | 5 | 5 |
| Ukraine | 3 | 2 | 4 | 6 | 7 | 9 |
| Sub total | 6 | 5 | 7 | 9 | 12 | 14 |
| NORTH AFRICA | | | | | | |
| Egypt | 0 | 0 | 0 | 0 | 1 | 0 |
| Sub total | 0 | 0 | 0 | 0 | 1 | 0 |
| ASIA | | | | | | |
| Japan | 0 | 0 | 0 | 0 | 0 | 0 |
| Korea | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub total | 0 | 0 | 0 | 0 | 0 | 0 |
| OCEANIA | | | | | | |
| Australia 2/ | 111 | 125 | 151 | 172 | 222 | 235 |
| New Zealand 3/ | 173 | 236 | 232 | 240 | 248 | 255 |
| Sub total | 284 | 361 | 383 | 412 | 470 | 490 |
| TOTAL | 847 | 929 | 887 | 876 | 1,005 | 1,001 |

Source: Counselor/Attached reports, Official Statistics. FAS/CMP/DL&P, AUG 2001, USDA

was only one third of European cheese and half of U.S. cheese (Griffin 1999). They took over the European Union share of on the Asian cheese import market and became the largest cheese suppliers in the Pacific Rim Asia since 1999. Their global market share was expected to reach near 49% in 2001 (FAS-USDA 2001).

Japan was the most important importer for Australian cheeses in 2000 (90,300 MT) and accounted for over half of Australia's total cheese export. Besides Japan, South Korea (16,000 MT in 2000) was also one of the three most important Australian cheese export markets (ADC 2002; FAS-USDA 2001). In addition to Australia, Japan (53,100 MT), the Philippines (9,700 MT), and Taiwan (5,100 MT) were included in New Zealand's top 10 cheese export countries during the 1999 and 2000 fiscal years. Pacific Rim Asia was New Zealand's largest export market, which accounted for 35% total cheese export (NZDB 2001).

As compared with these two Oceania countries, the U.S. cheese exports to this region were relatively small but growing (Table 2.2). The U.S. produces the largest amount of cheese when compared to the production of France, Germany, Australia, and New Zealand (Table 2.3). Nevertheless, U.S. cheese export is far below the other major producing countries (Table 2.1, FAS-USDA 2001). Thus, the USDA announced the Diary Export Incentives Programme (DEIP) in 1985; this plan subsidized U.S. dairy exports. The Pacific Rim countries were the largest buyers, and 29% of U.S. cheeses were exported to this region in 1999 (FAO 1999).

Table 2.2. U.S. cheese export to Pacific Rim Asia 1991-2000 (unit: metric ton).

| COUNTRY | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 2,367 | 1,377 | 1,278 | 2,125 | 5,045 | 6,797 | 5,990 | 7,161 | 8,710 | 6,541 |
| South Korea | 227 | 140 | 310 | 774 | 3,035 | 4,069 | 4,819 | 1,275 | 1,605 | 2,649 |
| Philippines | 369 | 307 | 299 | 465 | 152 | 421 | 762 | 938 | 1,016 | 977 |
| Hong Kong | 185 | 149 | 156 | 430 | 366 | 310 | 473 | 505 | 977 | 427 |
| Taiwan | 87 | 103 | 68 | 184 | 274 | 297 | 274 | 483 | 679 | 372 |
| Singapore | 136 | 185 | 139 | 155 | 236 | 290 | 384 | 426 | 757 | 368 |
| Thailand | 0 | 10 | 1 | 5 | 0 | 26 | 90 | 42 | 16 | 89 |
| Malaysia | 0 | 0 | 17 | 25 | 20 | 11 | 24 | 27 | 229 | 49 |
| Indonesia | 37 | 21 | 8 | 2 | 11 | 17 | 126 | 40 | 32 | 31 |
| China | 184 | 0 | 0 | 12 | 37 | 55 | 5 | 57 | 52 | 17 |
| Vietnam | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Cambodia | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 5,583 | 4,284 | 4,269 | 6,172 | 11,172 | 14,289 | 14,944 | 12,952 | 16,072 | 13,523 |

Source: FAS, FEB 2001, USDA

Table 2.3. Cheese production in selected countries (unit: 1,000 metric tons).

| COUNTRY | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| NORTH AMERICA | | | | | | |
| Canada | 289 | 329 | 330 | 329 | 321 | 340 |
| Mexico | 110 | 112 | 127 | 126 | 122 | 137 |
| United States | 3,274 | 3,325 | 3,398 | 3,581 | 3,744 | 3,750 |
| Sub total | 3,673 | 3,766 | 3,855 | 4,036 | 4,187 | 4,227 |
| SOUTH AMERICA | | | | | | |
| Argentina | 390 | 415 | 407 | 446 | 432 | 420 |
| Brazil | 385 | 405 | 421 | 434 | 445 | 460 |
| Venezuela | 77 | 70 | 66 | 60 | 65 | 62 |
| Sub total | 852 | 890 | 894 | 940 | 939 | 942 |
| EUROPEAN UNION | | | | | | |
| Denmark | 298 | 290 | 289 | 293 | 305 | 305 |
| France | 1,594 | 1,645 | 1,648 | 1,658 | 1,719 | 1,725 |
| Germany | 947 | 990 | 1,008 | 1,006 | 1,095 | 1,150 |
| Ireland | 92 | 89 | 92 | 95 | 96 | 102 |
| Italy | 950 | 985 | 1,003 | 969 | 1,000 | 1,000 |
| Netherlands | 688 | 693 | 638 | 655 | 681 | 650 |
| Spain | 160 | 162 | 176 | 198 | 210 | 220 |
| Sweden | 127 | 115 | 125 | 128 | 130 | 130 |
| United Kingdom | 364 | 368 | 358 | 361 | 333 | 330 |
| Sub total | 5,220 | 5,337 | 5,337 | 5,363 | 5,569 | 5,612 |
| EASTERN EUROPE | | | | | | |
| Poland | 133 | 158 | 164 | 155 | 145 | 150 |
| Romania | 92 | 95 | 94 | 95 | 92 | 90 |
| Sub total | 225 | 253 | 258 | 250 | 237 | 240 |
| FORMER SOVIET UNION | | | | | | |
| Russia | 173 | 165 | 170 | 185 | 220 | 230 |
| Ukraine | 60 | 45 | 52 | 53 | 57 | 60 |
| Sub total | 233 | 210 | 222 | 238 | 277 | 290 |
| NORTH AFRICA | | | | | | |
| Egypt | 325 | 370 | 380 | 382 | 370 | 380 |
| Sub total | 325 | 370 | 380 | 382 | 370 | 380 |
| ASIA | | | | | | |
| Japan | 33 | 34 | 35 | 35 | 34 | 35 |
| Korea | 0 | 3 | 10 | 14 | 15 | 16 |
| Sub total | 33 | 37 | 45 | 49 | 49 | 51 |
| OCEANIA | | | | | | |
| Australia | 268 | 285 | 305 | 320 | 361 | 420 |
| New Zealand | 230 | 240 | 266 | 245 | 270 | 282 |
| Sub total | 498 | 525 | 571 | 565 | 631 | 702 |
| TOTAL | 11,059 | 11,388 | 11,562 | 11,823 | 12,259 | 12,444 |

Source: Counselor/Attached reports, Official Statistics. FAS/CMP/DL&P, AUG 2001, USDA

Japan, South Korea and the Philippines were the main importers. Increasing import to Japan was due to the demand for cream cheese (fresh cheese) and grated cheese. However, other countries in this region imported only small amounts of U.S. cheeses (Table 2.2) (FAS-USDA 2002). Thus, the U.S. cheese industry faces strong competition in Pacific Rim Asia (Nubern 1999).

Marketing strategies used by New Zealand and Australia in Pacific Rim Asia

New Zealand and Australia developed successful strategies for marketing dairy products toward Pacific Rim Asia in the 90's. After a thorough investigation of the Asian market, the New Zealand Dairy Board (NZDB) became aware that Asian retail outlets were very small but fairly effective and that Asians shopped for groceries frequently. Thus, the NZDB adopted a very aggressive distribution system that was first developed in Sri Lanka in 1995, cooperating directly with retail outlets. They made sure that their products were always on the shelves. They used 70% of their investment to establish brand loyalty and leadership (Gasson 1995). The Australian Diary Corporation (ADC) did thorough market research towards Asian Pacific in 90's. The marketing research was funded by the Australian government for up to 0.5% of the total value of the dairy production (FAS-USDA 2000). Japan was their most successful case. They successfully determined the demand and then supplied dairy products preferred by the Japanese. In addition, they established quality assurance procedures and a strong relationship

with their main clients and customers by continuously and regularly sending representatives to communicate and solve technical problems (ADC 2001).

Besides these strategies, in 1995/1996 the NZDB spent 128.3 million USD on South East Asia, Latin America, and Middle East markets, and the ADC spent 3.9 million USD on Asian Pacific for promoting dairy products such as advertising (TV, magazine, radio, and press), educational videos and brochures for nutrition and in-store promotion and tasting (FAS-USDA 2000). Moreover, they cooperated with Asian domestic dairy industries to develop and market new diary products with local taste and preference. Snow Brand, the largest Japanese dairy company, built new production facilities in Australia (McMichael 2000; Nugent 2001). The NZDB developed two joint-venture operations in South Korea, Korea-New Zealand Cheese Company and Hanseng Foods in 1989 (Stringer 2000). In summary, Australia and New Zealand made extensive efforts to successfully expand their dairy export market in Pacific Rim Asia.

Reasons for increasing cheese consumption in Pacific Rim Asia

Population as well as economic growth in Pacific Rim Asia caused the increased demand for dairy products (FAO 1999; FAS-USDA 2000; Griffin 1995 and 1999; Nubern 1999; Olscheske 1990; Rae 1997; Zhou and Novakovic 1996). Booth (1999) reported that average annual growth rate in per capita Gross Domestic

Product (GDP) in Pacific Rim Asian countries was between 1.3% and 6.9% from 1960 to 1992 (Table 2.4). From 1992 to 1995 the average growth rate of GDP in Pacific Rim Asia was 7.5% (Griffin 1995). After the economic crisis which occurred in 1997 and again in 1998, the annual GDP growth rate in this region recovered to 7% in 1999 (WDI 2001).

Two phenomena related to economic growth were: increasing disposable income (Griffin 1999; Nielson and others 1992) and urbanization (Griffin 1999; Rae 1998). Income growth in Pacific Rim Asia is one of the main reasons for increasing cheese consumption (Anonymous 1999a; DG-AGRI-EC 2001; Olscheske 1990; Sørensen 1997). Pacific Rim countries encountered a rapid income growth during the 1980's and 1990's. For example, per capita income growth in the U.S increased 4 fold from 1970 to 1988 while it increased around 10 fold in Hong Kong, Singapore, and Japan, and over 15 fold in South Korea and Taiwan (Nielson and others 1992).

While income increased, dietary habits began changing. According to Rutherford (1999), there were four stages of alteration of dietary habits. Consumption of traditional staples grew in the beginning. Then, consumption of non-traditional staples increased. Patterns of consumption, including time and place, became diversified. Finally, consuming large varieties and volumes of higher protein and value-added foods such as ruminant meat, eggs, dairy products, and seafood was increasing. At this stage, consumption of traditional staples decreased and

Table 2.4. Per capita GDP growth of Pacific Rim Asian countries in 1960 and 1992 (Booth 1999).

| Country | Per capita GDP | | Average annual growth rate |
|---|---|---|---|
| | 1960 | 1992[a] | 1960-92 (%)[b] |
| Japan | 3052 | 15496 | 4.5 |
| Singapore | 1649 | 13095 | 6.9 |
| Taiwan | 1258 | 8211 | 6.3 |
| South Korea | 899 | 7464 | 6.9 |
| Malaysia | 1497 | 5614 | 4.4 |
| Thailand | 969 | 3931 | 4.1 |
| Indonesia | 589 | 2040 | 4.8 |
| Philippines | 1165 | 1707 | 1.3 |
| China | 559 | 1480 | 3.7 |
| Laos | N/A | 1377 | N/A |
| Burma | 315 | 608 | 1.8 |

[a] Data refer to per capita GDP in 1985 international dollars, adjusted for changes in the terms of trade. Data for Laos and Korea refer to 1991; for Korea to 1990 and for Myanmar to 1989.

[b] Calculated by fitting a semi-log function to the data.

non-traditional, animal-based, and what is perceived as better quality foods increased (Rae 1997; Tse 1994; Zhou and Novakovic 1996). Furthermore, gourmet food items (i.e. caviar, lobster and shark fin) with premium quality and very high price became more affordable and attractive (Griffin 1999). Asian consumers were willing to pay higher prices in order to get better quality and healthy foods (Anonymous 1999b; Nieslon and others 1992). For example, Asians pay more to get fruit which is fresher, tastes better, and looks cleaner.

As consumption of non-traditional food items increased, Asian diets were gradually more westernized. Western-style foods became very popular in Pacific Rim Asia (Access Asia 2001; Asia Cuisine 2001) because of mass media, international travel, and students studying abroad (Nielson and others 1992; Olscheske 1990). Diet westernization contributed to increasing cheese consumption (Anonymous 1999a; Chinafood.com 2001; Olscheske 1990; Sørensen, 1997). Its most obvious evidence was the strong expansion and success of fast food restaurants in this region. McDonalds is the largest fast food chain in the Asian Pacific region. They operate 4500 restaurants (around 800 outlets in Oceania) and 2000 new outlets were expected to be opened in 1998. The annual earning of these restaurants was about 31 billion U.S. dollars. Other fast food chains such as A&W, Popeye, Churchs/Texas Chicken, and Subway also focused on the market potential of this region and planned to expand the number of restaurants (Wolson 1998). The growth of fast food chain restaurants resulted in the introduction of fast food

related cheeses in the Asian diet, and cheese was gradually accepted by Asians. Those cheeses such as sliced cheese and mozzarella became one of the most demanded imported dairy products to the Philippines, Malaysia, Thailand, China, Singapore, and Vietnam (Griffin 1999).

Urbanization is another factor that has affected cheese consumption in Pacific Rim Asia. All Pacific Rim Asian countries excluding Japan are developing countries with income growth. Rapid urbanization has been a common phenomenon in developing countries. United Nations' data predicted that among the 26 urban agglomerations with more than 10 million people, 22 were expected to be in developing countries (Griffin 1999). Urbanization was found to be significantly and positively associated with consumption of animal products in East Asia (Rae 1998). Animal products are highly perishable, especially dairy products. Urban areas always have a better and more stable supply of electricity, which allows better cooling systems to prevent food spoilage. While income increases, typical urban families always have refrigerators available and can store these highly perishable foods (Griffin 1999; Rea 2001). This factor also increases people's willingness to consume perishable foods at home and therefore greater varieties of food products can be accessed by consumers (Griffin 1995).

While people's income grows and their residential area becomes more urbanized, their lifestyle changes as reflected by their food demands. Since western cultures

have spread into Pacific Rim urban areas, urbanites are influenced by western life styles and standards (Olscheske 1990). Living expenses in urban areas also become higher. Women have taken an important role in the work force, and that creates more dual-income families in cities (Chou and Liu 1999; Nielson 1992; Henke 1996). Both husband and wife usually hurry to go to work in the mornings and can no longer follow the traditional way of shopping for foods daily at wet markets. For example, urban Chinese and Hong Kong families used to shop twice a week on average (Tse 1994). They also have a limited time to prepare foods at home. As a result, urbanites usually go to western style supermarkets, hypermarkets, and convenience stores for grocery shopping instead of traditional wet markets. They also eat out frequently. These two phenomena are reasons for increased cheese consumption in Pacific Rim Asia (Anonymous 1999a; FAPRI 2001; Griffin 1999; Olscheske 1990; Sørensen, 1997).

Supermarkets, hypermarkets, and convenience stores have cooling chains for perishable products, including various cheeses (Griffin 1999). Cheese has exposure as people shop and thus its frequency of being purchased has increased. While the power of these stores grows, the stimulation of cheese consumption is dominant. The number of these stores has increased rapidly in urban Pacific Rim area. For example, there were 8808 supermarkets opened in South Korea in 1990, 7-Eleven had over 4000 outlets in Japan, and over 200 in Hong Kong in that same year (Nielson and others 1992). In a survey by Tse (1994), Koreans expressed

that supermarkets were their favorite places for shopping. 3114 convenience stores have been opened in Taiwan until 1996 (Henke 1996). The growth of hypermarkets in Taiwan during 1996-97 period was 57% (Anonymous 1999b). These stores offer greater varieties of home supplies and foods and have longer store hours than traditional wet markets; this factor alone is essential for the convenience expected in typical urban lifestyles (Henke 1996). Those stores also have better hygiene and sanitation status, which satisfy urbanites' basic demand for foods (Olscheske 1990). Although convenience stores cannot sell as many goods as supermarkets and hypermarkets, they are always located at a walking distance from homes and are open 24 hours a day. In Taiwan, it is generally perceived that foods in convenient stores are sold quicker; therefore, consumers like to buy snack foods and perishable items such as sliced cheese and bottled milk there (Henke 1996).

High frequency of eating out has become part of urban lifestyles in Pacific Rim Asia. Besides the convenience for typical dual-income families, Asians usually invite guests to have lunch or dinner at nice restaurants in order to show politeness and respect. Thus, eating out in an urban area is for convenience (trade-off with cooking and working time), polite social behavior, and leisure activity. Restaurant businesses have grown rapidly in urban areas. For example, from 3000 to over 7000 restaurants opened in Taipei, Taiwan during 1997 to 1998 (Liu 2000). Restaurants are almost everywhere, located at walking distance from work, and

many of them are open until late night. Although most restaurants serve the traditional cuisine, various kinds of non-traditional cuisine, which are mainly western styles such as American, French, Italian, Mexican, and fast foods, have become available and popular. Cuisine with cheese has had a higher chance to be ordered and eaten and thus frequency of consuming cheese has become higher.

Future cheese consumption and trade in Pacific Rim Asia

Dairy trade has progressively shifted from bulk dairy products (skim milk powder and butter) to higher value-added products (cheese and whey powder) since 1985. World cheese consumption is expected to increase in the future as well as cheese price. However, increasing cheese consumption will be more obvious in developing countries, mainly Asia, Latin America, and Middle East, while consumption of dairy products in the developed world has reached a near saturation point. Cheese consumption in these countries would grow more than 30% from 2000 to 2006 (DG-AGRI-EC 2001; FAO 1999; FAPRI 2001). Future cheese trade and consumption in Pacific Rim Asia will likely grow due to population growth, a fast recovered and steady growing economy, and reduced tariff rates toward dairy products. An annual growth rate of cheese consumption until 2002 was expected to be at least 2% (Anonymous 1999a). Asia will be one of the fastest population growing regions until 2010 and the average annual growth rate will be between 1.1% and 1.3%. Moreover, over half of the increased population (around 65%)

will be expected in Asia. The key countries will be China, India, Indonesia, Vietnam, and the Philippines (DG-AGRI-EC 2001; Nubern 1999).

Although the economical crisis in the summer of 1997 significantly reduced dairy export to this region as well as dairy prices, the economy in Pacific Rim Asia was observed to recover rapidly during the 1999 and 2000 period; this was due to the continuous strong effect of the U.S. economy, a steady expansion in Europe, and the beginning of the economy recovery in Japan. The annual GDP growth rate of countries in this region will exceed 6%, led by China (8%) (DG-AGRI-EC 2001). Phenomena resulting from economic growth included income growth, urbanization, diet westernization and alteration of lifestyles will continue to expand and thus will accelerate cheese consumption. Tariff reduction on cheese under WTO negotiation will also be expected. For example, Indonesia will reduce the tariff of cheese from 50% to 40% in 2004 (Bruem 2001).

In the near term, cheese trade in Pacific Rim Asia is expected to mainly rely on imports from New Zealand and Australia (DG-AGRI-EC 2001). These two countries will keep the advantages of low cheese price and geographical proximity (Bruem 2001); moreover, they use their healthy image – clean and green environment – to attract more Asian consumers in addition to their successful strategies (Gasson 1995; Nugent 2001). U.S. exports on the non-subsidized cheeses such as cream cheese would be increasing; however, exports under DEIP

will be reduced because of the World Trade Organization's Uruguay Round Agreement (Griffin 1999). The export of EU cheese will be still constrained by Uruguay Round Agreement until 2005. After that date, the competitiveness of EU cheese will be improved by the cut in EU support prices (DG-AGRI-EC 2001). While it is difficult to compete pricewise with New Zealand and Australian cheeses, U.S. cheese exporters must establish their competitiveness on premium quality and highly value-added products for home and restaurant uses (FAO 1999). Key issues on cheese export will be price, quality and taste (Nubern 1999).

China is one of the largest potential markets for cheese import in the world (Chinafood.com 2001; USDA 2000). China's economy has gradually changed to being market-oriented and has grown rapidly. China has become the 8th largest importer in the world in 2000 (WTO 2001b). It not only has the largest population in the world but also the highest annual GDP growth rate in East Asia. Its economy is expected to grow by 7% every year until 2010 (USDA 2000). The phenomena resulting from economic growth have occurred in urban areas. Also, the Chinese government promoted the dairy product market because the typical Chinese diet does not provide enough calcium (Access Asia 2001; Zhou and Novakovic 1996). Thus, cheese consumption in China is expected to grow drastically (USDA 2000). However, China's dairy market remained unnoticed until recently because of its small size, very few dairy products imported and complicated trading system (Zhou and Novakovic 1996). In December 2001

China joined the WTO and became the 143rd member. The tariff of cheese will be gradually reduced from 50% to 12% by January 2004 (WTO 2001b). Moreover, there will be fewer trade restrictions for cheese exporters. More trade opportunities will be opened to U.S. products (Nuzum 2001; USDA 2000).

In all, although future cheese trade and consumption in Pacific Rim Asia is expected to be increasing, it will heavily depend on the economical recovery and development, financial situations and dairy policies in these countries. Moreover, the new round of trade negotiations at WTO and enrollment of new Members (i.e. China and Taiwan) will have a powerful influence (DG-AGRI-EC 2001; Griffin 1999). China will be a new battlefield for U.S. cheeses with other competitors. Bilateral trade agreements between U.S. and China (permanent normal trading relations, PNTR) are being developed (IDFA 2002). Hopefully U.S. cheese manufacturers can use their trade advantages to expand their exports; in addition, doing thorough marketing research, targeting Chinese's cheese consumption and preference and finally establishing practical marketing strategies will be the foundation of successful cheese export.

## CROSS-CULTURAL STUDIES IN TASTE SENSITIVITY AND PREFERENCE

To probe differences between cultures is always an important step before developing marketing strategies for conducting successful international trades.

Culture is the most powerful determinant in human taste perception and preference because it affects food selection conceptually, cognitively and behaviorally. The context, frequency and intensity of food-related flavors that are experienced and come to be preferred can be decided by dietary habits. Culture strongly influences dietary habits unconsciously and environmentally. Thus, understanding cultural differences can help food manufacturers modify and design new products (Prescott and others 1997).

Sensitivity and preference of four basic tastes, sweetness, sourness, saltiness, and bitterness, in water solutions

Researchers have used various concentrations of sour, bitter, salty and sweet solutions and media to try to find out the differences of taste sensitivities and preferences among cultures. They believed similar patterns might occur within foods. However, very few differences were found among cultures. For instance, Bertino and others (1983) compared taste sensitivities between American and international students from Taiwan. Similar response patterns were observed between the two groups for a determined range of concentrations of bitter, sweet and salty solutions. Lungdren and others (1986) conducted tests with subject groups from Sweden, the U.S., Switzerland, Japan, Australia, the U.K., Finland, Germany, France and Poland and subjects evaluated the pectin gel samples with manipulations of firmness, aroma, sweetness, sourness, and flavor. There were

only a few differences found between countries. In Druz and Baldwin's experiment (1982), there were no differences between detection thresholds for sweetness, sourness, saltiness and bitterness between subjects from Nigeria, Korea and USA. On the other hand, taste intensities above threshold were also examined and no significant differences were found between different cultural groups. Lundgren and Johansson did cross-cultural experiments of discriminative thresholds on saltiness (USA, Sweden, Poland and the Netherlands) and sweetness (USA, Poland, Switzerland and Sweden). They found no difference in saltiness thresholds and a slight difference in sweetness thresholds among cultures (Johansson and others 1973; Lundgren and others 1976). Another study by Holt and others (2000) confirmed that Australian and Malaysian student subjects have equal abilities to discriminate the sweetness tastants from low to high concentration levels in liquids.

A study that compared taste preferences of North American with Taiwanese students residing in the U.S. showed that a range of both sweet and salty solutions was perceived as more pleasant (Bertino and others 1983). Another study by the same group showed that students from mainland China residing in the U.S. rated strong sweet solutions and weak salty solutions as being more pleasant than did American students, but the stronger salty solutions were less pleasant (Bertino and Chan 1986). A study that compared Australian and Japanese subjects' liking for tastes in solution showed no cross-cultural differences in hedonic ratings across six

levels of sweet, salty or bitter solutions. However, in the comparison between Australian and Japanese subjects in umani taste and sourness, Japanese subjects preferred the highest intensities (Prescott and others 1992). Thus, although the origin of cultural-based preference for taste in solution is unclear, it might include differential experiences with tastes within foods (Moskowitz and others 1975). In addition, simple familiarity exists in the umani taste among Japanese subjects (Prescott and others 1992; O'Mahony and Ishii 1986).

Taste sensitivity and preference in an overall food context

The overall food context would also strongly affect results in cross-cultural comparisons of psychophysical judgments of tastes within foods. Bertino and others (1983) compared perceptions of sweetness of cookies in which sucrose content was varied over seven levels between American and Taiwanese students. The Taiwanese students consistently rated cookies sweeter than did American students. Since American cuisine uses more sweeteners than Chinese cuisine, the results can be interpreted that culture strongly affects the sweetness perception between Chinese and American groups.

In the case of taste preference within foods, it might be reasonable to speculate that preferred levels would rely to a large extent on previous exposure and familiarity to a particular level within each food type. In the Australian and Japanese

cross-cultural studies (Laing and others 1993, 1994; Prescott and others 1998), only slight differences existed between Japanese and Australian subjects in rating intensities of sweetness, saltiness, sourness, and bitterness on the presented food samples. However, the liking of these four basic tastes on foods samples between the two ethnic groups were considerably different. The difference may reflect the effect of familiarity with the overall food context because each culture gave higher hedonic ratings to foods from their own cultures in many cases. Another study showed that Australian and Malaysian students liked similar sucrose levels in juice, custard and biscuits. These levels were similar to the amount of sucrose in commercial products (Holt and others 2000). These results revealed the necessity of investigating food familiarity in different cultures. Unfamiliarity can be speculated to negatively influence human preference on foods due to neophobia (Prescott and others 1998). Thus, the role of exposure and familiarity is important in the development of taste preferences.

Chung (1999) developed a seven-process model that included familiarity, verbal concept, context effect, and expectation. That model was based on the findings of determination of optimum sweetener level in a sport-drink for Asian countries in order to examine cross-cultural differences in food preferences and acceptances. The author indicated that familiarity was the key factor in identifying an optimal sweetener level for sport-drinks. Also, concept and context information strongly influenced the evaluation of product expectations and sensory properties of

sport-drinks. The effect of culture in expectation ratings was huge. Thus, this model was validated in their research; however, more model identifications in other food systems are required.

The cross-cultural response to a sensory attribute is dependent on the food context in which it is presented. In the comparison of Japanese and Australian responses to sweetening treatments of orange juice, cornflakes and ice cream, Japanese subjects' overall liking on cornflakes were more affected by its sweetness intensity. Fruitiness in orange juice, saltiness in cornflakes, and creaminess in ice cream were more influential on Australian subjects' overall liking (Prescott and others 1997). Holt and others (2000) found that sweetness intensity and preference ratings were significantly different between Australian and Malaysian students but the differences were food-specific. Different sucrose levels in high fat and biscuits were hardly discriminated by subjects within the two groups. Manufacturers hoping to export food products to countries with significantly different cuisine will need to perform some modification of the sensory qualities of their products before they achieve optimal acceptability.

Cross-cultural scaling effect

Yeh and others (1998) explored the effect of scale usage in consumer sensory analysis among different cultures to reduce scale biases and refine measurement

tools. The 9-point hedonic scale with word anchors, which is popularly used by American consumers (reference), was directly translated into Chinese, Korean and Thai. Participants from these regions used the scale differently from the American participants. Thus, the scaling effect needs to be seriously considered in cross-cultural studies. Then, modified hedonic scales were designed and their efficiency was examined. As a result, an unstructured line scale was efficient for Chinese participants and a 17-point structured line scale was efficient for Thai and Koreans. Therefore, it is critical to select the correct scales in cross-cultural studies in order to maximize data efficiency and reliability.

## FOCUS GROUP INTERVIEWING

Focus group interviewing is a social-oriented data collection procedure. Each group discussion is conducted with the objective of getting participants' perceptions in the defined area of interest; in addition, the environment should be non-strict and non-threatening, which makes participants feel comfortable to express their ideas and thoughts towards questions of research interest (Krueger 1988).

Since focus groups involve a small group of people, the data provide qualitative views of research of interest and cannot be used quantitatively (Krueger 1988; Resurreccion 1998). The discussion should be flexible, unstructured and free-flowing. Thus, it is useful to examine varieties of topics with a variety of

individuals and in a wide range of settings. Focus group interviewing can be used to acquire general background information on topics of interests, to gather new ideas and creative concepts, to explore and deduce potential problems and to create impressions of products, services, institutions or other objects of interest. Moreover, it is used to test research hypotheses that will be the focus of further research and understand how participants express and respond to the phenomenon of interest. The information gained may help to improve the design and research tools of future studies, especially a study that might be employed in more quantitative research (Stewart and Shandasani 1990). As compared with other qualitative methods, a focus group is relatively quick and cheap (Morgan and Krueger 1993).

The procedure of a focus group involves planning, moderating, analyzing and reporting. First, research objectives are defined in the planning stage. Then, questions are developed, modified, and pre-tested. Arranging personnel and staffs, establishing plans for timeline, recruiting, and analysis, determination of participants, and organizing locations, dates and times for interviewing sessions are also included. In addition, the role of the moderator is defined and participants are recruited (Krueger 1988; Morgan and Scannell 1997).

During the sessions, the moderator should create a non-threatening atmosphere to stimulate participants' willingness to talk in front of the group. Both the

moderator and assistant cannot participate in the group discussions to avoid a leading bias. Probing is necessary to elicit additional information. Because a focus group is a qualitative method, formal statistical analysis that uses quantitative continuous data is not appropriate. The analysis of focus group results examines words, context, internal consistency, frequency, extensiveness, and intensity of comments and the uniqueness of responses that participants express as well as the opinions that they did not say during discussion. Exploring the biggest and most common ideas is always essential. Finally, the results should be reported logically, clearly, and attractively (Krueger 1997a and 1997c).

Focus group discussion and analysis follows six systematic steps starting in a planning stage and finishing in result reporting (Krueger 1997a). First, questions are carefully designed to maximize insights from subjects. Data capturing must be efficient and complete during and after each discussion. A proper data coding process is used in transcripts. Intents of subjects are appropriately verified and recognized. Debriefing sessions help the moderator and the assistant to seize first impressions and highlight important topics before their memory decays. Finally, preliminary and later reports are shared with the subjects and others who were involved in the study, such as clients and personnel (Krueger 1997a).

# SURVEY RESEARCH

Surveying is one of the most popular research techniques used in various fields such as social and political science, marketing and education research, and public health (Fraenkel and Norman 1993; Neutens and Rubinson 1997; Shi 1997). It derives from census taking, which investigates entire populations for information; it was first used by ancient Egyptians (Babbie 1973). Surveying is used to systematically obtain information such as facts, knowledge, attitudes, beliefs, and behaviors from the samples representing large populations of interests by asking questions (Fraenkel and Norman 1993; Shi 1997; Tull and Albaum 1973). In contrast with focus groups, it is a quantitative data collection method (Shi 1997).

## Survey types

There are several ways to classify survey type. Based on time, it can be divided into cross-sectional survey and longitudinal survey. A cross-sectional survey targets samples from the population of interest within one time point or a short period of time. Due to this characteristic, the accuracy of information might be depended on the capability of respondents' memory (Babbie 1973; Shi 1997). On the other hand, a longitudinal survey is composed of several repeated surveys. It targets samples from the population of interests in a series of time points. Usually

this type of study is conducted during a longer period of time and not all the same researchers might be involved in the study period.

In addition to classification according to time, data collection procedure classifies survey into two types, self-administration and interview. In self-administration surveys, subjects are asked to fill in questionnaires by themselves. There are four data collection methods for self-administration. First, the direct administration to a group is when researchers meet and pass out questionnaires to a group of subjects in one place. High rates of responses, low cost, and opportunity for the researchers to explain the questionnaires before subjects complete them are the main advantages of that method. However, it is not appropriate in many survey studies (Babbie 1973; Fraenkel and Norman 1993). In mailing surveys, questionnaires are mailed to the subjects and then subjects mail them back after completion. This is a relatively low cost method, could be done by researchers alone, and it gives the subjects sufficient time to complete the questionnaires. Nevertheless, the low response rate is the main disadvantage of that method (Babbie 1973; Fraenkel and Norman 1993; Salant and Dillman 1994; Shi 1997). Drop-off survey is when researchers deliver questionnaires directly to the subjects' residences, working places, community centers or schools. After the questionnaires are completed, they can be mailed back the by subjects themselves, or directly collected by the researchers. This method has the advantage of a relatively lower cost than a mail survey and it gives researchers the opportunity to

explain the questionnaires to the subjects. An internet survey, which lets subjects complete the questionnaires either on e-mail or on a particular website, is a very new method. However, sampling is limited to people who are internet users and thus it is not as common as the other survey methods (Salant and Dillman 1994).

Survey interviews include face-to-face and telephone interview methods. A face-to-face interview is a traditional method and the most efficient way to conduct a survey. A researcher physically appears in front of a subject and directly obtains information from her/him. It has many advantages such as no missing data and high capability of using complicated questionnaires. Its main disadvantage is a very high cost and it is time-consuming. The other method is telephone surveying. Subjects are asked questions through telephoning. It has the characteristics of face-to-face interview and is relatively cheaper, quicker and more time flexible. However, only listed telephone users can be sampled. Random digit dialing, which the nine number keys are randomly dialed, can avoid this problem. Telephone surveying is also less efficient for sensitive questions because subjects are not observed visually during interview (Babbie 1973; Fraenkel and Norman 1993; Salant and Dillman 1994; Shi 1997).

Procedures of survey research

Procedures of survey research involve several steps. First, research problems and objectives are defined. Secondly, assumptions and hypotheses are established through gathering background information from the literature or conducting preliminary studies such as focus groups. Survey questionnaires are designed, refined, and pre-tested. Multiple-choice is the most popular question design in surveys. Proper coding technique in response is essential. In the meantime, organizing related personnel, issues, and materials, and personnel training also need to be done. Sampling needs to be done randomly in order to ensure that samples are truly representative to the population of interests. Then, the data are collected through different types of surveys (Backstrom and Hursh-César 1981; Shi 1997).

The data should be decoded, inputted, re-checked, and missing values dealt with after their collection and before their analysis (Shi 1997). When doing data analysis, the first issue is counting the number of responses from each category of each question and calculating its percentage. Making tables to show response counts and percentage distributions is useful. Different statistical tools such as non-parametric and multivariate data analysis are used to analyze results in order to examine the research hypotheses and satisfy the research objectives. Finally, results are reported with tables and graphs. Logic, clarity, and honesty are the foundations of a good survey report (Babbie 1973; Salant and Dillman 1994).

# III. HABITS, PURCHASING AND CONSUMPTION BEHAVIORS, ATTITUDES, OPINIONS AND EXPECTATIONS TOWARD CHEESE OF 25 TAIWANESE INTERNATIONAL STUDENTS – A FOCUS GROUP STUDY

I-Min Tsai
Mina R. McDaniel, Ph.D.

ABSTRACT

25 international students who were originally from Taiwan and were divided into two groups, newcomers and at-least-one-year residents, and then investigated through focus groups to obtain preliminary information regarding their habits, purchasing and consumption behaviors, attitudes, opinions and expectations toward cheese. The Chinese culture truly influenced subjects' response. Cheese was not a reason to consume fast foods. It was rarely (less than once per 2 months) consumed at home in Taiwan. Consuming a cheese sandwich at breakfast was the most common way to consume cheese. Individually wrapped cheese slices sold in a small package was popular for home use. Cheese, usually melted, was always consumed with other foods, and in a restaurant setting. Cheese was considered difficult to combine with typical Chinese foods; however, the combination could be accepted if new recipes were specially developed. All subjects were not familiar with cheese types and names and had a very limited knowledge about cheese when residing in Taiwan. Nevertheless, after residing in the U.S. at least a year subjects more frequently purchased and consumed cheese, gained more knowledge about and become more familiar with cheese, but did not like it more. Sensory descriptors were generated and subjects' sensory expectations were discussed. Non-sensory descriptions related to package, healthiness, usage convenience, price, brand, promotion, recommendation, and advertising were also expected.

# INTRODUCTION

International cheese trade plays an important role in world dairy markets. It has grown and expanded in recent years, especially in Pacific Rim countries where cheese is not a traditional food (Anonymous 1999a; Griffin 1999). Imports to this region have increased 322% from 1987 to 1995 (Sørensen 1997). Although market potential is high, the U.S. exports very little cheese to this region. Its major dairy competitors, New Zealand and Australia, are the main suppliers of Pacific Rim imports due largely to their thorough market research in Pacific Rim countries, and to their close proximity. Cheese exports by New Zealand and Australia have had unusually high growth in the past five years (FAS-USDA 2001).

China joined the World Trade Organization (WTO) in December 2001 (WTO 2001). It is expected that U.S. dairy exports will grow four-fold and China will purchase over 135 million dollars of U.S. dairy products annually. Tariffs on cheese will be reduced from 50% to 12% over a five-year period and the U.S. export sales of cheese is expected to increase significantly (Schildhouse and Wells 2000). Other countries also have attempted to expand cheese exports toward China. For example, New Zealand and China have completed a WTO bilateral agreement (USDA 2000). It is apparent that China will become the most important and potential cheese import market in the world (Chinafood.com 2001; USDA 2000).

However, cheese acceptance among Chinese people is not clearly understood and is rarely investigated.

Food markets in Pacific Rim Asia have been targeted by major food companies in the U.S., Europe and Australia due to their market size and their willingness to consider Western-style foods (Prescott and others 1998). Phenomena related to economic growth including income growth, urbanization, diet westernization, alteration of lifestyles, and increasing educational levels are the main reasons for the increasing cheese consumption in this region (Anonymous 1999a; DG-AGRI-EC 2001; FAO 1999; Olscheske 1990; Sørensen 1997). Asian consumers have increased their demand for a higher quality of life. More and more Asians dine out and are willing to choose foods other than their staple and traditional cuisine when their income level becomes higher. Also, they have extra money to travel to Western countries and experience new cuisines, which include cheese. With the popularity of fast food restaurants such as McDonalds and Pizza Hut in Pacific Rim countries, American cheese (processed type) and mozzarella in melted form are readily accepted on pizzas and hamburgers by a certain subset of Asian consumers (Olscheske 1990). In all, cheese is gaining acceptance in Pacific Rim Asia.

Although cheese is gaining acceptance, it is known that Asians generally do not like cheese when first exposed to it. It remains unknown why Asians don't like

cheese; cheese acceptance is rarely investigated. A few studies have focused on Asian-U.S. residents with nutrition and public health concerns. Nguyen and others (1983) found Vietnamese children who had resided in California for one year consumed very little cheese. Story and Harris (1988) reported that 54% of Asian refugee high school students in Minneapolis, MN seldom or never consumed cheese. Moreover, these students indicated that cheese was one of their most disliked foods. In a nutritional investigation of pregnant women residing in Oakland and San Francisco, CA, 69% of Chinese immigrants consumed less than 20% of the monthly allotment of cheese freely supplied to them (Horswell and Yap 1999). Ishihata and others (1999) used Japanese children living in Michigan and Indiana as the target to explore cheese consumption; they found cheese was rarely selected and these children disliked the taste of cheese. Furthermore, cheese did not fit in their everyday diet pattern.

Watanabe and others (1997) studied the consumption of selected diary products (milk, yogurt and cheese) in Japan. 18.4% of Japanese residents had never consumed cheese before; over 45% of Japanese residents consumed cheese less than three times a month. Japanese residents consumed cheese at home most often for breakfast and thought cheese to be healthy and nutritious. In 1999, Watanabe and others used three qualitative attribute models to predict dairy product consumption behavior in Japan by conducting mail-in consumer surveys regarding milk, domestic cheese and imported cheese consumption in order to identify

important factors influencing domestic versus imported cheese consumption. Taste, price and health concerns were the three most important factors affecting domestic and imported cheese consumption positively or negatively (or both) in Japan.

The relationship among cheese import, consumption and acceptance in Pacific Rim Asia is unclear and contradictive. With the goal of exporting U.S. cheese into Pacific Rim countries and increasing and expanding benefits to U.S. cheese industries and manufacturers, it is necessary to understand this relationship by exploring the sensory properties of cheese that Asians will accept as well as their attitudes and behaviors around cheese. Since China will be the largest potential market for U.S. cheese in Pacific Rim Asia, targeting Chinese people is essential. People from Taiwan were selected as subjects in this study because cheese consumption in Taiwan provided a reliable prediction of future consumption trend in China (Zhou and Novakovic 1996).

A Focus group is a qualitative data collection method and has the advantages of being economical and quick (Morgan and Krueger 1993). It is an appropriate method in this study because it is commonly used to investigate background information of new research topics. Its collected data are often adopted into future quantitative studies such as a consumer survey (O'Brien 1993; Stewart and Shandasani 1990). Thus, the specific objectives of this study were to obtain

background information on habits, behaviors, opinions and attitudes of participants' cheese purchasing and consumption in Taiwan for further quantitative research. Moreover, participants' alteration of habits, behaviors and attitudes regarding cheese purchasing and consumption after residing in the U.S. for at least one year were also determined. Participants' sensory and non-sensory expectations and preferences of cheese were finally targeted. Reasons behind these issues were probed.

## MATERIALS AND METHODS

### Pilot focus group sessions

Two pilot sessions were held in order to test the questions (see Appendix 3.1) and to practice with the moderator guide used in focus group discussions. They were held in August, 2000. Participants were international students from Pacific Rim countries studying at Oregon State University and all of them were from 21 to 30 years old. Eight participants (three from Taiwan, three from Indonesia, one Thai and one Korean) joined the first session and seven panelists (two from Taiwan, two from Indonesia, two Thais and one Korean) participated in the second session.

In the first session, participants discussed topics regarding their cheese purchasing and consumption behaviors in their countries and in the U.S., knowledge and

familiarity about cheese, and other attitudes about cheese such as melted versus unmelted cheese, fast foods and the possibility of combining cheese and their cuisines. The second session was sample evaluation. Monterey Jack, peppered Jack (Tillamook), sharp Cheddar (Kraft), mild California Cheddar, whole milk mozzarella and Wisconsin Parmesan were the cheese samples presented. Participants were asked to describe the sensory characteristics of the samples. They were also instructed to define accepted and unaccepted descriptors among samples. Based on the results from the pilot groups, the experimental designs including the moderator guide for conventional focus groups were modified and clarified.

Focus group sessions

Twenty-five students from Taiwan currently studying at Oregon State University were contacted by telephone or e-mail to participate in this study. All subjects were from 21 to 30 years old except one 19-year-old subject. They were divided into two categories according to their time residing in the U.S.. The first category (13 subjects; 2 males and 11 females) consisted of students who had just arrived in the U.S. within one month and was named "new-arrival" (NA). The second category (12 subjects; 6 males and 6 females) consisted of students who had resided in the U.S. for at least one year and was named "one-year-resided" (OR). Each category was divided into two mini (n=6) focus groups (Krueger 1988).

Two two-hour sessions were held for each group in September, 2000. All sessions were recorded by audio and video equipment and were conducted using Mandarin; both moderator and assistant were bilingual.

The moderator guide followed the procedures described in Krueger (1997b). Questions followed a "general-to-specific" flow. Most questions were open-ended to identify the response direction of subjects. Questions in the first session covered attitudes, phenomena, behaviors, familiarity and expectations of the two categories of subjects regarding cheese (see Appendix 3.2). In the beginning, the moderator asked subjects about their impression of cheese and their first experience with cheese. Subjects' attitudes related to cheese in hamburgers and pizza, and healthiness and cultural aspects regarding cheese were examined. Subjects were asked about cheese recognition by looking at pictures of different types, forms, and package sizes of cheese (see Appendix 3.3). Questions were asked regarding their knowledge about cheese usage in foods. Purchasing and consumption behaviors of cheese and concepts of cheese quality were also key interests. Subjects in the OR category were asked their changes regarding cheese consumption after residing in the U.S.. The common phenomenon that young Asians do not like cheese but often eat fast foods containing cheese was discussed. Finally, subjects were asked to express their non-sensory expectations that influence their decision-making. Findings affecting these key topics were carefully probed by follow-up and serendipitous questions in order to explore in-depth opinions of subjects.

Questions in the second session included sensory characteristics (appearance, aroma, texture and flavor) of cheese driving acceptance and other expectations of cheese (see Appendix 3.2). There were three phases in the second session: initial phase, sample evaluation and concluding phase. In the initial phase, subjects were asked to recall from past experience how to describe the sensory properties of cheese and evaluate how each descriptive term related to their acceptance of cheese. Kraft sharp Cheddar and Kraft sliced processed cheese (Kraft Singles) were chosen as samples to validate the efficacy of the consumer terms. These cheeses were chosen because subjects in the pilot group stated that sliced processed cheese was the most popular cheese in Pacific Rim Asia, and it is a cheese which most people have experienced. It has been used in fast food restaurants and most people in Taiwan have been aware of it (Olscheske 1990). In addition, sharp Cheddar cheese has a strong flavor that may be deemed unacceptability to most Asians.

Cheese was presented to subjects melted and unmelted. The unmelted cheese was served with no medium. The melted cheese was served on two media, bread and rice. Cheese samples were made into 3cm*3cm*0.25cm slices for both unmelted and melted cheese. The bread was cut into 4cm*4cm*1cm slices (Williams Premium Sandwich). The rice (Pacific International Medium Grain Calrose Rice) was cooked in a rice cooker for 35 minutes. 20 grams of cooked rice was placed in foil cups. Cheese slices were put on top of bread and rice and the combinations

were baked at 190°C for six minutes. After coming out of the oven, melted cheese combinations were immediately evaluated by subjects.

Two-stage serving was used to ensure the appropriate temperature of the melted cheese. The first series of samples (unmelted; melted on bread and rice) was presented for evaluating appearance and aroma. Then, the second series was presented for texture and flavor evaluations. Subjects were asked to evaluate the melted cheese on bread first, then the melted cheese on rice and finally, unmelted cheese. Sample serving order was randomized. During sample evaluation, subjects were asked to describe the cheese samples and to report if each descriptor positively or negatively affected liking.

In the concluding phase, subjects described differences in sensory characteristics and their acceptance between unmelted and melted cheese and between melted cheese on bread and on rice. They also expressed the three most and least important descriptors used in the session. They stated the sensory characteristics which cheese should and should not have. Finally, they reported both their sensory and non-sensory expectations of cheese, and the key elements of their "dream cheese".

Collection and analysis of responses from focus groups

Response transcripts were generated from registration forms (see Appendix 3.4) filled out by each subject, which contained demographic information, field notes written by assistant and moderator during discussion, debriefing summary and notes from watching videotapes and listening to audiotapes. Debriefing was held between moderator and assistant to discuss the focus group after each session. They compared notes, clarified the most important themes, demonstrated expected and unexpected responses and decided the possible quotes used in the report and alterations for the next group (Krueger 1997c). Subjects' non-verbal expressions were observed during sessions by the assistant (Reed and others 1998) and after sessions by watching videotapes. They were also included in the transcripts.

The cut-and-paste technique was used to analyze response transcripts (Krueger 1997a; Stewart and Shamdasani 1990). All transcripts were copied; the original transcripts were kept intact and saved. The copied transcripts were gone through carefully and the major topics and issues were classified and examined. In order to make the analysis efficient, colored marking pens were used to draw brackets and other symbols to code different topics in the text. The color-coded transcripts were cut up and all relevant pieces were grouped together. The statements regarding each topic and issue were summarized, interpreted and supported by sorted materials. NA and OR subjects' behaviors, attitudes, familiarity and

expectations toward cheese were compared, and then conclusions were drawn and reported.

## RESULTS AND DISCUSSIONS

### Subjects' habits and behaviors regarding cheese purchasing and consumption in Taiwan

#### Purchasing cheese and consuming it at home

Both NA and OR groups were questioned about their frequency of plain cheese purchasing and consumption when living in Taiwan. No group differences existed. 15 out of 25 subjects had never bought plain cheese in Taiwan and had never consumed cheese at home (except 3 subjects whose mothers regularly bought cheese). These 3 subjects consumed cheese at home almost daily for health purposes. Ten out of 25 subjects bought cheese, but the frequency was low: 5 subjects only bought it once; 2 subjects bought it once a year; one subject bought it once per six months; 2 subjects bought it once per two months. They (these 10 subjects) mentioned that their cheese consumption at home was low.

All 25 subjects did not know cheese types and the names of cheeses when living in Taiwan. They (n=25) recognized cheese by color (yellow and white), shape

(sliced, chunk, shredded and spreadable), brand and package. They all agreed that small sized packages (10, 12 or 24 slices) of yellow or white sliced cheese individually wrapped with plastic film have the highest frequency of purchasing in supermarkets and home consumption in Taiwan as compared with other sized package and forms of cheese. All of them thought sliced cheese was the most common form in almost every supermarket in the urban area and was the only available cheese in semi-urban area, although chunk and spreadable cheeses are common in big supermarkets, some bread stores and bakeries in big cities.

All 25 subjects agreed that sliced cheeses were preferred in home usage in Taiwan. They are used most often to make a sandwich for breakfast. Sliced cheese was been preferred by Japanese and general Chinese consumers residing in Taiwan and Hong Kong in 1980's (Olscheske 1990); sandwiches were the popular homemade food for breakfast in Japan (Wanatabe and others 1997). The reason that a sandwich is a popular homemade food is that none of the subjects knew how to cook food with cheese when they were in Taiwan. A sandwich is the only well known form used by most subjects to consume cheese at home. All of them thought it was convenient, easy and quick to use sliced cheese and bread to make a sandwich. Moreover, the size of sliced cheese was suitable for the size of bread and ham.

Grated Parmesan in the "green can" package was also usually consumed both at home and at restaurants. According to Olscheske (1990), pizza was the fastest growing food item in Japan and Taiwan. Shredded and grated cheese started to be demanded by consumers. In addition, Taiwan imported mostly Kraft cheese products in the past. Based on this study, the "green can" package for grated Parmesan from Kraft is familiar to Taiwanese consumers due to consumption of pizza at restaurants. However, all 25 subjects did not purchase it in supermarkets. When ordering pizza, it was always provided with the delivery and they used it on the pizza at home.

Purchasing and consuming cheese at restaurants

All subjects (n=25) bought and consumed foods containing cheese at restaurants in Taiwan. Cheese sandwiches (n=25), fast foods (n=25), Italian cuisine (n=11), cheesecake (n=21) and au gratin foods (n=18) were popular choices. Cheese sandwiches, cheese bread and bagels with cream cheese were often bought and taken out in the morning (when choosing foods containing cheese). Fast foods (hamburger and pizza), au gratin and Italian foods were consumed generally at lunch and for dinner. Cheesecake and bagels with cream cheese were usually consumed as desserts (Table 3.1).

Table 3.1. Types of food containing cheese consumed often at restaurants (or often purchased and taken out) and the occasions where these foods are generally consumed in Taiwan.

| **Food containing cheese often consumed** | **Occasion generally consumed the food** | **Number of subject reported, out of 25** |
|---|---|---|
| Cheese sandwich | Breakfast | 25 |
| Pizza | Lunch; dinner | 25 |
| Hamburger | All meals | 25 |
| Cheesecake | Dessert | 21 |
| Au gratin (seafood, noodle, vegetable, rice...etc.) | Lunch, dinner | 18 |
| Italian foods | Lunch; dinner | 11 |
| Cheese bread | Breakfast | 4 |
| Bagel with cream cheese | Breakfast; dessert | 2 |

22 of 25 subjects (11 NA and 11 OR subjects) reported that they consumed cheese at restaurants much more frequently than at home in Taiwan. They preferred to purchase the food containing cheese at restaurants than cheese itself in the supermarkets. Two reasons explained this phenomenon. First, 24 of 25 subjects reported that they often ate out when in Taiwan, where eating out is generally inexpensive as compared to the U.S.. That was one main reason for their higher frequency of cheese consumption at restaurants. Liu (2000) reported that one recent survey conducted by Ogilvy & Mather Pte. Ltd. indicated that people in Taiwan eat out often, especially in big cities. 300 residents in Taipei were interviewed and 40% of them reported that they often dine out (over twice or three times a week). This survey found that people in big cities are always hurried and busy. People eat breakfast during the time going to work or school. Lunch is eaten when a person is hunger. Half of married women work outside the home. There is no time to prepare a dinner for the family. As a result, people accommodate by dining out or purchasing food from outside and eating dinner at home. Liu (2000) also reported that restaurant business grew rapidly in Taiwan. During 1997 and 1998, the number of restaurants increased from 3000 to over 7000 in Taipei. People can choose many types of food, including Chinese, Japanese, Western and other cuisines. Thus, it is very convenient to eat out in big cities in Taiwan. If people want to eat cheese, they don't have to buy cheese and cook it with foods at home. They can easily purchase food products made with cheese as an ingredient.

Second, all subjects (n=25) agreed that it is difficult to make cheese foods (except sandwich) at home. Most cheese cooking requires an oven in which to bake food. Since baking is not part of Chinese home cooking, most families in Taiwan don't have ovens in their kitchens. As a result, most cooked cheese dishes are consumed while dining out instead of at home.

Consuming cheese with food

24 out of 25 subjects from two groups reported they always consumed cheese with food. 22 subjects (12 NA and 9 OR subjects) had never consumed cheese by itself. Cheese was always cooked with other foods when sold at restaurants or consumed at home. Their first experience with cheese involved the consumption of hamburgers, pizza, cheesecake, Italian cuisine and sandwiches. Thus, they were used to consuming cheese with food and never considered that cheese could be eaten alone. Moreover, eating cheese alone was thought to be boring. Almost all subjects (12 NA and 12 OR subjects) thought cheese was a condiment. It should be consumed with other foods. For example, they (n=24) agreed that cheese played only a supporting role in hamburgers and pizza. They agreed that cheese was passively accepted because it is always eaten with foods. After evaluating samples, 15 of 25 subjects (10 NA and 5 OR subjects) could not accept eating ummelted cheese alone. They (n=15) thought the taste was strong cowy and the

aroma was stinky. It was cold and oily and their gastrointestinal system was not used to it.

Subject's attitudes regarding cheese

Attitudes regarding melted and unmelted cheese

24 out of 25 subjects from both groups agreed that they were used to consuming melted cheese in Taiwan. Moreover, they (n=24) preferred to consume melted cheese. 10 subjects from both groups had experience consuming cheese at home. 9 of them usually combined a slice of cheese with hot toasted bread (or a hot steamed bun) and/or a newly fried egg when making a cheese sandwich at home. This method could make cheese be totally or partly melted in it. In Taiwan, cheese is usually melted and combined with other foods (i.e. hamburgers, pizza, cheesecake... etc.). Unmelted cheese (consumed only or with food) was a rare form. Subjects were exposed in the environment of consuming melted cheese with food and got used to it. Chinese people are used to consuming more hot food than cold food. Almost all subjects from both groups (n=23) believed that unmelted cheese was raw and inedible because it was cold; melted cheese was cooked and edible because it was heat-treated and hot. The aroma of melted cheese was creamy and cheesy; there is more cheese aroma diffused into the air.

This aroma is important as it helps a person determine whether or not this is a cheese he/she wants to eat.

All NA and OR subjects (n=25) agreed that melted cheese was easily combined with non-Chinese hot food. The aromas of some hot foods with melted cheese were easily accepted because the combination can cover the unacceptable cheese aroma (i.e. cowy) and help release acceptable cheese aroma (i.e. creamy). They (n=25) reported that melted cheese also improved the texture of food. It made the whole combination become more smooth, chewy, stringy, moist, salty, creamy and viscous. 7 of 12 OR subjects thought there were more cooking options with melted cheese. Unmelted cheese was only eaten with bread or crackers, or used as a salad topping, which easily made them feel bored with it. Thus, one female OR subject stated, "Eating cheese hot and melted with food is the most correct way for cheese."

Familiarity of cheese

All NA Subjects (n=13) were only somewhat familiar with cheese; they had quite limited knowledge about cheese. Olscheske (1990) also pointed out that general Chinese consumers were not familiar with cheese. They might be somewhat familiar with the processed cheese because of fast food restaurants. In this study, two main reasons resulted in the unfamiliarity. First, all subjects from both groups

(n=25) thought cheese does not belong in Chinese culture. They never thought or cared about cheese in their diet. Eating cheese was not a habit in Taiwan. Their parents always prepared traditional Chinese food. In addition, their parents or elder generations had difficulty accepting cheese. Some subjects in both groups mentioned that their parents and grandparents thought cheese was not healthy, eating it was hazardous (n=8) and hamburger and pizza were junk foods and bad for their health (n=23). One NA female subject stated, "My Mom always throws my cheese away and prohibits me to purchase it because she thought the cheese smells like a spoiled food and it must be bad for health." In fact, general Pacific Rim Asians thought cheese had a bad taste and was smelly and even poisonous because cheese was not their traditional food (Griffin 1999).

The second reason related to the frequency of grocery shopping in Taiwan. 24 of 25 subjects in both groups (12 NA and 10 OR subjects) do not do grocery shopping and cooking in Taiwan. Mothers always take responsible for shopping and do not buy cheese (n=21). In addition, cheese is not sold in traditional markets where people generally do their grocery shopping in Taiwan. All Subjects (n=25) agreed that young people in Taiwan had almost no chance to be familiar with cheese products and to make foods containing cheese at home.

Attitudes regarding fast foods

The fast food restaurants business has grown rapidly in Asia in recent years. This growth is considered to contribute to cheese promotion because most fast food items contain cheese (Griffin 1999; Nielson and others 1992; Wolson 1998). Even though cheese is a major component of fast foods (pizza and some hamburgers), cheese was not one of the reasons for eating fast foods. 23 subjects from both groups reported that they did not pay attention to the presence of cheese in hamburgers and pizza. Some subjects (11 of 25 subjects) recalled that they seldom purchased cheeseburgers. 15 of 25 subjects thought pizza should contain cheese; however, they agreed if pizza were made without cheese, people in Taiwan would still consume it.

All subjects from both groups (n=25) thought they didn't need fast food in their daily diets. It was not as essential as Chinese cuisine. They reported that they consumed fast foods not because of liking but due to other reasons, although they agreed that fast foods were consumed more frequently than other foods containing cheese. First, fast foods were not seen as delicious but simply convenient. If they did not want or do not have time to cook, they would go eat hamburgers or pizza at fast food restaurants, order a delivery or take them out from restaurants. Convenience is a key issue of urban lifestyle in Taiwan and China (Anonymous 1999b; Zhang and others 1999). Second, 20 out of 25 subjects reported if they

wanted to meet or celebrate with friends, fast food restaurants would be often their first place to consider.

All 25 subjects strongly agreed that young people in Taiwan might not like hamburger and pizza, but they go to fast food restaurants often. Young people think consumption of fast foods is fashionable because these foods are from western countries. Fast food industries have developed successful marketing strategies to attract young people and children to consume their products. Children are attracted by toys inside the combo package. In addition, fast food restaurants always have a children's entertainment area, which is important for children in Taiwan due to the limited entertainment space for children. Media advertising introduced the concept that fast food restaurants create an atmosphere of getting together and celebration for young people. Fast food restaurants also welcome students to discuss assignments. They are clean and the environment is safe and simple. Based on these findings, subjects' attitudes regarding fast foods were not related to cheese. The expansion of the fast food business is probably not related to increased cheese consumption and liking in Taiwan.

The possibility of combining cheese with Chinese foods

All subjects from both groups (n=25) agreed that it was impossible to combine cheese with the Chinese cuisine eaten every day. Cheese is not similar to any

Chinese food. In addition, it is not compatible with Chinese seasonings or condiments such as anise and soy sauce. Nevertheless, they agreed that some Chinese foods might combine with cheese and become accepted if new recipes were specially developed. Rice could be combined with cheese and then accepted if other seasonings and ingredients were added. These recipes must be easy and quick to make, combine with rice and oriental seasonings and ingredients, do not require special equipment and should be delicious cuisine. In another words, if cheese could be included as part of people's diet or if food containing cheese were made to meet oriental requirement, people would purchase and consume more cheese. Subjects suggested several possible ways to combine Chinese foods with cheese: Au gratin (n=25) and steamed (n=2) foods, thick soup (n=8), foods with thick sauce (n=7), foods requiring adding milk or butter (n=25), foods which maintain the Chinese tradition after adding cheese (n=18) and dessert (n=25).

After evaluating melted cheese with bread and plain rice (the staple food in Asia), some subjects from both groups (n=10) could not accept the combination of plain cheese and rice. Although other subjects (n=15) reported that they could accept the combination, they would not eat it. All 25 subjects thought that cheese with bread was common and appropriate. No group differences existed. All 25 subjects from both groups had never experienced plain rice with cheese in the past; however, they had consumed rice with cheese in au gratin food. Subjects thought rice should only be eaten plain, with side dishes (typical Chinese cuisine). If

cheese were baked (or fried) and melted on plain rice, the combination would be odd and unacceptable. Melted cheese on plain rice made it become oily and greasy and unacceptable. The flavors of melted cheese on plain rice were too rich and strong. All 25 subjects thought it was strange to combine cheese and plain rice together. One female OR subject stated, "Cheese is usually to be eaten with foods made from wheat, not rice.

Some subjects from both groups (n=10) mentioned that young adults and teenagers have high acceptance of new and novel foods in big cities in Taiwan. Research also indicated that Chinese consumers are open-minded to accept new types of and foreign foods (Denton and Xia 1995). Chinese consumers have had respect for American products. They thought products from the U.S. always had good quality (Olscheske 1990; Tse 1994). However, developing appropriate marketing strategies and a long-term marketing plan is extremely important in Taiwan and China.

Alteration of subjects' behaviors, knowledge and attitudes regarding cheese purchasing and consumption after residing in the U.S. for at least one year

Increasing the frequency of cheese purchasing and consumption

10 of 12 subjects in OR group expressed that they had increased their frequency of purchasing and consuming cheese both at home and at restaurants and decreased their frequency to consume Chinese cuisine (Table 3.2) after residing in the U.S. for at least one year; all 12 OR subjects experienced western culture after residing in the U.S. and cheese is a major food in the western diet. One male OR subject stated, "Cheese is everywhere in the U.S.. It's difficult not paying attention to cheese when doing grocery shopping in supermarkets, dining out and joining parties with American friends." They (n=10) bought not only foods containing cheese at restaurants but also started to purchase small packages (less than 2 lbs) of cheese in supermarkets. Most (n=10) consumed more types and shapes of plain cheese at home. They (n=10) chose medium Cheddar, mozzarella, Colby and Monterey Jack and cream cheese as well as processed cheese and Parmesan. They also consumed shredded and chunk cheese as well as sliced cheese (Table 3.3). Yang and Read (1996) investigated the dietary habits of 124 Asian immigrants who resided in Nevada at least 6 months and they found that these immigrants' diet became more westernized by increasing consumption of butter and cheese. Thus, residing in the U.S. for a while could stimulate cheese consumption among Asians.

Table 3.2. Chinese cuisine consumption of U.S.-resided subjects (OR) in Taiwan and in the U.S..

| **Frequency** | **In Taiwan** | **In the U.S.** |
|---|---|---|
| More than once a day | 12 | 3 |
| Once a day | 0 | 6 |
| Once per two days | 0 | 1 |
| Once per three days | 0 | 2 |

OR: subjects residing in the U.S. at least for one year

Table 3.3. Cheese types consumed often at home in Taiwan by both new-arrival and U.S.-resided subjects and in the U.S. by U.S.-resided subjects only.

| In Taiwan (NA[a] and OR[b] subjects) | In the U.S. (OR[b] subjects only) |
|---|---|
| Grated parmesan in "green can" | Grated parmesan in "green can" |
| Sliced yellow or white cheese individually wrapped (10, 12 or 24 slices). Type of cheese unknown. | Sliced processed and cheddar cheese (12 slices). |
| | "Cheese + cracker" snack pack |
| | Shredded mozzarella and Colby/Monterey Jack |
| | Chunk Monterrey Jack and medium cheddar (2 lbs) |
| | Cream cheese |

[a]NA: new-arrival subjects

[b]OR: subjects residing in the U.S. at least for one year

There are several reasons stimulating increased cheese purchasing and consumption among these 12 OR subjects. They reported that although Chinese restaurants were available, it was much more expensive eating out in the U.S. (except fast food restaurants) than in Taiwan. In addition, some OR subjects (n=4) agreed that most Chinese foods offered at restaurants were Americanized probably due to the difference of ingredients and food material and the concentration on preference of Americans. There was almost no chance to consume typical Chinese cuisine in the U.S. (except big metropolitan areas such as New York and Los Angeles). Most restaurants in the U.S. provided non-Chinese foods. If dining out, they often chose non-Chinese cuisine, increased their opportunity to consume cheese, and gained knowledge of cheese usage in foods. Fast food restaurants are everywhere and are not as expensive. All 12 OR subjects agreed pizza and hamburgers were the most common and convenient foods for students. They often consumed fast foods and that also increased cheese consumption.

Gaining knowledge of and becoming more familiar with cheese

All 12 OR subjects expressed that they became more familiar with cheese and gained more knowledge about cheese after residing in the U.S. for a period of time. They reported that they started to be aware of the types of cheese available in the supermarkets. When the two groups of subjects were asked to report all cheeses that they have already known, "type unknown" was the minor response (3 out of 48

response) in the OR group but the major response (12 out of 18 responses) in the NA group. Over half of OR subjects knew medium Cheddar (n=6), mozzarella (n=7), and cream cheese (n=6), which were the most common cheeses available in supermarkets and at restaurants (Table 3.4). All of them did grocery shopping in the U.S.. They saw different types of cheese in supermarkets and realized the name of different cheeses. They recognized the name of cheese in the foods they consumed at restaurants.

All 12 OR subjects realized more ways to consume cheese. Most OR subjects (n=10) were not good at cooking Chinese cuisine since their parents always took responsible for cooking in Taiwan. After residing in the U.S., they started to learn cooking from TV shows, recipe books and magazines, and from American friends and imitating foods eaten at restaurants. It is difficult to buy Asian ingredients, materials and seasonings and make Chinese foods at home. Moreover, making Chinese cuisine is more time-consuming and difficult. They tend to use available material or semi-finished products to make easier foods such as sandwiches, pizza and spaghetti, foods that usually require cheese. While cooking these foods at home, they learned more ways to consume cheese. Sliced cheese bought to make sandwiches was still the most popular way to consume cheese at home (n=12); shredded cheeses were bought to make pizza (n=7), nachos (n=2), salads (n=2) and spaghetti (n=7) at home in the U.S. (Table 3.5).

Table 3.4. Number of new-arrival and U.S.-resided subjects who consume and can name the cheese type.

| | NA[a] subjects n=13 | OR[b] subjects n=12 |
|---|---|---|
| American | 2 | 5 |
| Cheddar medium | 0 | 6 |
| Cheddar sharp | 0 | 3 |
| Colby Jack | 0 | 3 |
| Monterey Jack | 0 | 3 |
| Flavored Jack | 2 | 2 |
| Mozzarella | 0 | 7 |
| Parmesan | 0 | 5 |
| Cream cheese | 2 | 6 |
| Others | 0 | 2 |
| Type unknown | 12 | 3 |

[a]NA: new-arrival subjects

[b]OR: subjects residing in the U.S. at least for one year

Table 3.5. Foods and corresponding cheeses that were cooked and consumed at home by new-arrival and U.S.-resided subjects in Taiwan and by U.S.-resided subjects in the U.S..

| In Taiwan (NA[a] and OR[b] subjects) | | In the U.S. (OR[b] subjects only) | |
|---|---|---|---|
| **Foods** | **Cheese** | **Foods** | **Cheese** |
| Sandwich | Sliced cheese | Sandwich | Sliced processed cheese<br>Sliced cheddar cheese<br>Sliced Swiss cheese |
| Garlic bread | Grated Parmesan | Garlic bread; baguettes | Grated Parmesan |
| Bagel | Cream cheese | Bagel | Cream cheese |
| Steamed bun with fried egg and cheese | Sliced cheese | Cheesecake | Cream cheese |
| | | Au gratin buttered Chinese cabbage | Shredded Colby /Monterey Jack<br>Shredded mozzarella |
| | | Nachos | Shredded Colby/Monterey Jack |
| | | Bread stick | Shredded or chunk mozzarella |
| | | Salad | Shredded cheddar cheese<br>Blue cheese |
| | | Roasted chicken | Grated Parmesan |
| | | Spaghetti | Grated Parmesan<br>Shredded mozzarella |
| | | Frozen pizza | Grated Parmesan<br>Shredded mozzarella |
| | | Meat | Grated Parmesan |
| None | Sliced cheese | None | String cheese |
| | | None | "Cheese + cracker" snack pack |

[a]NA: new-arrival subjects

[b]OR: subjects residing in the U.S. at least for one year

3 of 12 OR subjects indicted that they began consuming unmelted cheese (string cheese, chunk and sliced cheese) generally as a snack. They indicated that they would eat unmelted cheese if the food item were normally consumed with unmelted cheese such as unmelted cheese in a cold salad, and string cheese eaten directly from a package.

Attitudes regarding cheese acceptance after residing in the U.S. for a period of time

Although all 12 OR subjects became more familiar with and consumed more cheese, they did not like cheese more. They increased the consumption of cheese in the beginning because cheese was new to them. However, they did not find it more delicious after eating it often. They thought their dietary habits had already developed and they were used to eating Chinese food. If they ate a lot of cheese, they felt bored with it and disliked it. Thus, dietary experiences play a more important role than familiarity on cheese acceptance although both of them are key factors of acceptance for tastes in foods (Bertino and others 1982; Bertino and Chen 1986; Druz and Baldwin 1982; Laing and others 1993, 1994). All 12 OR subjects agreed if Taiwanese people started to eat cheese in their early childhood, cheese consumption would be included in dietary habits. If Taiwanese people are used to eating cheese, they become familiar with it and then they truly like it. The reason that OR subjects consumed more cheese was related to the environment. They decreased their consumption of Chinese foods due to limited availability and

increased consumption of American foods, becoming used to eating cheese. All 12 OR subjects reported that when they return to Taiwan, they intend to return to their original dietary habits.

Expectation of cheese

Sensory characteristics driving acceptance

The sensory characteristics of cheese driving acceptance of all 25 subjects from both groups were expressed in the second session of focus group discussion. First, the subjects used 71 terms to describe their impression about cheese appearance, aroma, texture and flavor from their past experience (before evaluating samples) (Table 3.6). There were no apparent differences between NA and OR subjects. They (n=25) defined these terms as positive (acceptable) and negative (unacceptable) descriptors. Not everyone agreed on some terms such as "color" acceptability (yellow vs. white) and degree of moistness. For example, some subjects thought the yellow color of cheese was acceptable and white color was unacceptable. Nevertheless, some subjects had a totally reversed response (white color is acceptable and yellow color is unacceptable). The acceptability of some descriptors depended on their intensities such as "viscous", "dense", "soft", "springy", "chewy", "sour" and "salty". "Salty" taste should be strong enough to cover unacceptable cheesy character. Subjects watched pizza advertisements and

Table 3.6. Positive and negative terms that both new-arrival and U.S.-resided subjects (n=25) defined and used to describe cheese from their past experiences in the initial phase (before evaluating samples).

**Positive (acceptable) descriptors**

| Appearance | Aroma | Texture | Flavor |
|---|---|---|---|
| Unmelted | Buttery | Chewing gum | Buttery |
| Holes | Cooked marshmellow | Cooked marshmellow | Cooked marshmellow |
| Sliced | Creamy | Not too chewy | Creamy |
| Orange | Milky | Dense | Mild |
| White | Rich | Melts in mouth | Milky |
| Yellow | | Milk caramel | Not bitter |
| Melted | | Moist | Not too salty |
| Stringy | | Smooth | Rich |
| Melted really hot | | Not too soft | Salty |
| | | Stringy | Sour |
| | | Viscous | Sweet |

**Negative (unacceptable) descriptors**

| Appearance | Aroma | Texture | Flavor |
|---|---|---|---|
| Large chunk | Baby vomit | Adheres to teeth | Baby vomit |
| Moldy | Bacterial growth on agar | Chewing gum | Bitter |
| Rubber hose | Cowy; goaty | Dry | Fermented |
| Hard laundry soap | Fermented (sour) | Grainy | Greasy; oily |
| White | Moldy | Hard | Plain |
| Yellow | Plain | Moist | Too salty |
| | Spoiled egg | Powdery | Too sour |
| | Spoiled fish | Rough | |
| | Spoiled food | Too springy | |
| | Spoiled sour milk | Too viscous | |
| | Stinky socks & shoes | Waxy | |
| | Stinky sour | | |

NA: new-arrival subjects

OR: subjects residing in the U.S. at least for one year

cartoons and got their first impressions of "stringiness" and "cheese with holes". Because pizza advertisements always show stringiness of cheese when separating pizza pieces, 24 of 25 subjects were strongly influenced and they thought cheese should be stringy. Some of them from both groups (n=7) thought the large chunk shape made them feel pressure to consume more; it was large and could not be totally consumed before it would spoil. Thus, they did not prefer a large chunk of cheese.

Subjects tended to describe samples by using the 71 terms created in the initial phase during the sample evaluation. Even though some terms did not appear in the samples, subjects still used "not..." to describe cheese characteristics. For example, "stringy" was not part of the texture for both cheese types tasted, but subjects used "not stringy" to describe the texture of samples. They added more terms in appearance ["opaque", "plastic", "translucent", "wrinkle", "oily" (-) and "glossy" (+)], aroma ["yogurt" (+)], texture ["fine" (+)] and flavor ["sour and bitter aftertaste" (-) and "baby vomit" (-)]. However, the subjects did not think that all the terms were important enough to influence their purchasing and consumption behaviors although they expressed their degree of acceptance. For example, "cooked marshmellow" was a positive term for aroma and texture (Table 3.6), but it was not powerful enough to be one of the essential characteristics of accepted cheese when subjects purchase and consume cheese. Subjects summarized accepted and unaccepted descriptors that were based on their expectations and

which drove their acceptance (Table 3.7). These summarized descriptors were useful for future consumer tests because they were generated by naïve and untrained subjects. The terms were not technical and were easily understood by general consumers.

*Appearance*

Although subjects used many terms to describe appearance (Table 3.6), it was said to be the least important sensory characteristic. All 25 subjects were only concerned about color, moldy, oily and stringy appearance. Color should be either yellow or white and plain. Cheese should not look moldy and oily. Thus, blue cheese was defined unacceptable. Melted cheese should look stringy. Subjects thought stringy appearance could whet their appetite. Most subjects from both groups (n=22) thought melted cheese should be hot, moist and glossy. In addition, they expected to see "steam" arising from the melted cheese, although this phenomenon probably results from the heating of the cheese carrier rather than the cheese itself.

*Aroma*

All 25 subjects agreed that "good" cheese aroma give them an appetite. They wanted to smell a "strong" aroma before tasting cheese foods. "Good" aroma

Table 3.7. Acceptability of cheese sensory characteristics that all subjects (n=25) reported.

**Appearance**

| Descriptors | Acceptable |
|---|---|
| Color | Plain yellow/white |
| Moldy | No |
| Oily | No |
| Stringiness | Yes |
| Brightness | Glossy |
| Temperature | Hot; smoke |
| Moisture | Moist |

**Texture**

| Descriptors | Acceptable |
|---|---|
| Chewiness | Appropriate/strong |
| Stringiness | Strong |
| Springiness | Appropriate |
| Viscosity | Appropriate/strong |
| Density | Appropriate/strong |
| Powdery | No/less |
| Grainy | No/less |
| Softness | Appropriate |
| Smoothness | Strong |
| Moist | Appropriate |
| Adhere to teeth | No |
| Fine | Yes |
| Melting on mouth | Yes |

**Aroma**

| Descriptors | Acceptable |
|---|---|
| Intensity | Strong |
| Buttery | Appropriate/strong |
| Creaminess | Appropriate/strong |
| Cheesy | Strong |
| Yogurt sourness | Less |
| Cowy/goaty | No |
| Baby vomit | No |
| Spoiled food and sourness | No |
| Stinky | No |
| Saltiness | Appropriate |

**Flavor**

| Descriptors | Acceptable |
|---|---|
| Intensity | Mild |
| Buttery | Appropriate/strong |
| Milky | Appropriate/strong |
| Creaminess | Appropriate/strong |
| Oily | Less |
| Moldy | No |
| Cowy/goaty | No |
| Dairy sourness | Appropriate |
| Baby vomit | No |
| Bitterness | No/less |
| Spoiled | No |
| Stinky sour | No |
| Sour/bitter aftertaste | No/less |

including "creamy", "buttery" and "cheesy" should be appropriate or strong. "Bad" aroma including "cowy", "baby vomit", "spoiled food and sour" and "stinky" should be reduced or eliminated. Weak yogurt sourness and appropriate saltiness were acceptable and also important.

*Texture*

All 25 subjects thought texture directly drives their liking and acceptance. They wanted cheese that melted in their mouths but did not melt on their hands. If it melted on their hand, it was greasy and disgusting. It should not be powdery and grainy and adhere to their teeth. Appropriate chewiness, springiness, viscosity, density, softness and moisture were necessary. Smoothness, stringiness and fineness (porcelain-like) were also essential.

*Flavor*

All 25 subjects thought flavor equates to quality. It was the most significant sensory factor that subjects were concerned about. Flavor was also one of the most important positive and negative factors affecting cheese consumption in Japan (Wanatabe and others 1999). All 25 subjects thought that the intensity should be mild. According to Olscheske (1990), mild flavor of cheese was demanded by Japanese and general Chinese consumers residing in Taiwan and Hong Kong.

Some subjects (n=3) complained about imported cheese in Taiwan being too salty and too strong, especially the cheese from the U.S. (too salty and too oily). All subjects wanted cheese that had an appropriate or strong creamy, buttery and milk taste. Dairy sourness was appropriate and necessary. Sour and bitter aftertaste, bitterness and oiliness should be low. Cheese should not taste moldy, cowy, spoiled and stinky sour, like baby vomit.

In all, subjects reported sensory descriptors of cheese that drive their acceptance. However, how much creaminess is ideal? How mild or strong should the overall flavor intensity be? These questions must be answered by consumer tests conducted in Taiwan.

Non-sensory expectations of cheese

Non-sensory factors driving cheese acceptance were discussed. First, all 25 subjects from both groups reported their expectations related to package, ingredients and product consistency and freshness. Cheese should be packed under vacuum, as subjects thought that it was safe when packaged that way. Packaging material should be transparent; therefore, the content inside could be seen in case defects existed. Every slice of cheese should be plastic wrapped because the slices are totally separated, seem to preserve longer and are easy to handle. Hong Kong consumers also reported that they preferred single sliced

plastic-wrapped cheese (Olscheske 1990). Package should be clean, intact and not inflated. Cheese must not break apart and must not have odd things such as dirt. Ingredients used in making cheese should be of good quality and processing must be safe and companies should have good quality control in place. The same product should be consistent in order to assure good quality when subjects purchase it time after time. Package size was not supposed to be large, which was no more than 500 grams. All subjects preferred small or smallest size because they were afraid not to eat it before it expired. Freshness was also important. For example, two OR subjects mentioned if they need cheese tonight, they would purchase cheese in the morning or right before cooking. They kept their purchasing habit used in Taiwan: people always bought and consumed fresh foods and they shopped for food every day. The expiration date must be labeled clearly on the package.

Second, subjects expressed their expectations related to the healthiness of cheese. 20 of 25 subjects thought cheese should be low calorie, low fat, low salt, high calcium and not cause diarrhea or other gastrointestinal problems. The modern diet emphasizes "healthy" in Taiwan. It must contain so-called "two lowness and two highness" which means low calories and low fats and high calcium and high fiber (Liu 2000). Literature also suggested dairy products consumed by Asians have to be low fat (Oldwayspt.org 2001). Quak and Tan (2002) reported around 60% to 70% Asians generally affected by lactose intolerance. Cheese could easily cause diarrhea and intestinal gas. However, a few subjects (n=5) never thought

about the relationship between cheese and health and they did not care about it. They were concerned only with the taste of cheese.

All 25 subjects were concerned with convenience. They would purchase sliced cheese instead of chunk cheese because of the convenience. They were also interested in candy-like chunks (very small chunk) of cheese. Those products are available in Asia but not in the U.S.. They liked a small size and cute shape such as star-like and animal-like cheese. They thought it was easier to eat cheese as a snack than as a meal. They also liked flavored cheese (fruity, onion flavors...etc.). 11 of 12 OR subjects were knowledgeable regarding cheese usage. For example, if they wanted to make spaghetti at home, they would purchase Parmesan.

Subjects' expectations of price and brand of cheese and importance of media were reported. Price should not be very cheap but reasonable. 20 of 25 subjects preferred a middle price. Chinese people prefer to choose things in the middle, especially something with which they are not familiar. They also believe price reflects quality; therefore, they seldom chose the cheapest. Subjects would purchase more cheese if there were a discount given. Similar to price, all 25 subjects thought cheese brand reflects its quality and type. The cheese brand they purchase must be known, seen on ads, recommended by friends or have a good reputation. Asians were usually attracted by known brands because of thier reputation and representative quality (Griffin 1999). According to Olscheske

(1990), the media plays an important role in cheese promotion in Taiwan society. They offer information about cheese and allure people to consume cheese which stimulates consumption.

Similar attitudes of decision-making of purchasing and consumption are applied when subjects decide to purchase a new cheese. Subjects suggested that there should be a promotion with samples provided in the supermarkets. Ads on TV or other media for this product must be seen. The package and appearance should be attractive. String, sliced or candy-like cheeses were strongly preferred. Middle priced cheese is first considered by many subjects (n=23). They felt that it is unsafe to pay a high price to purchase unknown products. Also, Chinese people believe "cheap price; worst product". Subjects did not have confidence to purchase low priced cheese because they were worried about its quality. In all, appropriate marketing strategies such as promotion and advertisement are critical in Taiwan.

## CONCLUSION

Four conclusions were drawn from this study. Focus group discussions provided background thoughts and possible explanations about the questions of interests. Culture and society strongly influenced on consumption behaviors, attitudes, habits, and expectations toward cheese. Cheese was an unfamiliar food although cheese

consumption had increased in the past 10 years in Taiwan. Finally, residing in the U.S. within a limited time slightly improved subjects' knowledge and familiarity toward cheese; however, it did not make subjects' dietary habits westernized.

Based on these conclusions, the U.S. cheese manufacturers should seriously consider the influence of culture and society, the position of cheese in modern Chinese's dietary pattern. Developing appropriate marketing strategies, educating consumers about cheese and reformulating or inventing new cheeses to satisfy consumer expectations are critical. Sensory panels should be conducted in order to accurately measure Chinese's acceptance and preference on cheese for product development.

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# IV. SURVEYING PURCHASING AND CONSUMPTION BEHAVIORS, ATTITUDES, OPINIONS AND SENSORY EXPECTATIONS TOWARD CHEESE OF NATIVE URBAN RESIDENTS IN TAIWAN

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ABSTRACT

This study targeted the cheese consumption behaviors, attitudes and opinions regarding fast foods and cheese, and cheese sensory expectations of urban Taiwanese. Cheese was consumed most frequently at restaurants, generally with other foods and in a melted form. The most frequent occasion to consume cheese both at home and at restaurants was for breakfast. Small sized packages and sliced forms of cheese were used popularly at home. A cheese sandwich was consumed most frequently both at home and restaurants; in addition, fast foods, au gratin foods, spaghetti and cheesecake were popular at restaurants. Aroma, texture, flavor, health concern, usage convenience, and price were considered the most influential product characteristics affecting purchasing decisions. Other characteristics including visual and marketing messages also had influence. Taiwanese are willing to try new Chinese foods incorporating cheese. Yellow color, glossy appearance, stringy-looking and stringy-texture, creamy aroma, melt-in mouth, soft, smooth and fine texture, and buttery and milky flavor were expected to be present in cheese. Oily appearance and flavor, bitterness and bitter and sour aftertaste needed to be avoided. A previous focus group study provided good predictions and explanations for this study. Suggestions to U.S. cheese manufactures are made.

## INTRODUCTION

The average Pacific Rim Asian consumers used to think that cheese has unpleasant odor and taste and be poisonous. However, Pacific Rim Asia has become the most important market for cheese exports (FAO 1999). Although cheese is not included in Asians' usual diet (Griffin 1999) and per-capita cheese consumption is still considerably lower than in North American and European countries (FAS-USDA 2001), cheese imports in this region increased 322% from 1987 to 1996 (Sørensen 1997). However, the import market share of U.S. cheese in this region was much smaller than the market share of the European Union, New Zealand, and Australia (FAS-USDA 2001).

Without a doubt, fast food restaurants have boomed in Pacific Rim Asia, and through these restaurants, cheese (mainly sliced cheese and pizza cheese) was introduced to Pacific Rim Asians (Griffin 1995, 1999; Sørensen 1997). Reasons of increasing dairy consumption in Pacific Rim Asia were also included increasing population, urbanization, disposable income, and the power and number of supermarkets, convenient stores, and hypermarkets (FAO 1999; Griffin 1995 and 1999; Nubern 1999; Olscheske 1990; Rae 1997; Zhou and Novakovic 1996). The taste preference of Asians on cheese was gradually changed, especially in urban areas (Griffin 1999).

There have been only a few research projects focused on cheese consumption among Pacific Rim Asians. Cheese consumption behavior is not clearly understood and was rarely investigated despite the fact that Pacific Asians have gradually accepted cheese. Public health researchers have pointed out that cheese was not preferred and was not often consumed by Pacific Rim Asians (Horswell and Yap 1999; Ishihata and others 1999; Nguyen and others 1983; Story and Harris 1988; Wanatabe and others 1997). Wanatabe and others (1999) studied cheese consumption behavior in Japan. They found taste, price, and health concerns were the most influential on increasing consumption of domestic and imported cheese. Therefore, information remains vague and contradictive between cheese import and its consumption and acceptance in Pacific Rim Asia.

The present study is targeting native Taiwanese urbanites. The Chinese are the largest ethnic group in the world. China has one fifth of the world population and its annual economic growth has average 10% in since 1980. Seven-percent growth in the economy is anticipated until 2010 (USDA 2000). According to Zhou and Novakovic (1996), patterns of import and consumption of dairy products in Taiwan offer a good reference for future trends in China. Moreover, China and Taiwan became the 143rd and 144th WTO member in December 2001 and January 2002 respectively. Tariffs on cheese will be reduced from 50% to 12% over a five-year period, ending in 2004 (WTO 2001a, 2001b). It is expected that more opportunities for cheese imports to the Chinese market will be opened for the U.S.

The goal of this study was to investigate consumption behaviors, attitudes, opinions, preference and expectations of cheese among native Chinese people in order to help the U.S. dairy manufacturers successfully expand their cheese export into the integrated Chinese marketplace, including Mainland China, Hong Kong, and Taiwan. A previous focus group study (Chapter III) was conducted in order to obtain preliminary information toward these topics among 25 Taiwanese university students who had resided in the U.S. within a limited time period. From the results, the objectives developed for this study were

1. to determine behaviors surrounding cheese consumption at home and at restaurants of native Taiwanese urbanites,

2. to explore native Taiwanese urbanites' opinions regarding their decision-making when purchasing cheese in supermarkets,

3. to investigate native Taiwanese urbanites' attitudes and opinions regarding fast foods (hamburger and pizza) and cheese consumption,

4. to understand native Taiwanese urbanites' liking, opinions and expectations regarding appearance, aroma, texture, and flavor, of cheese

5. to quantitatively verify previous focus group findings from Taiwanese university students residing in the U.S..

# MATERIALS AND METHODS

## Sampling of Taiwanese consumers

The survey was conducted in two metropolitan areas in Taiwan, Taipei and Taichung. According to the population reports provided by the Department of Statistics, Ministry of the Interior, R.O.C. in June 2001, 8.24 million people resided in the great Taipei area, including Taipei City, Taipei County, Keelung City and Taoyuan County. 2.10 million people resided in great Taichung area, including Taichung City, Taichung County, Changhwa County and Nantou County. The 16 most populated regions in great Taipei and the 15 in great Taichung areas were chosen (Table 4.1).

Drop-off interviewing (Salant and Dillman 1994) was used. Thirty-one sub-surveyors participated in this study and one sub-surveyor was responsible for one region. They were instructed regarding screening and survey procedures and the problems that might occur when surveying. They screened people at schools (universities and high schools), local community centers, or subjects' residences. They explained surveys to qualified subjects and passed out questionnaires to them. Most subjects completed the questionnaires at the same time. A few subjects could not respond immediately, and their questionnaires were picked up by the sub-surveyors after one week. Due to the restriction of budget, time, and

Table 4.1. Population of sampling regions in grand Taipei and Taichung metropolitan areas

**Grand Taipei metropolitan areas**

| City/County | Region | Population* | No. of Subject |
|---|---|---|---|
| Taipei City | Daan Region | 316,797 | 39 |
| (7 regions) | Shihlin Region | 293,612 | 14 |
| | Wenshan Region | 253,691 | 15 |
| | Neihu Region | 253,987 | 13 |
| | Beitou Region | 248,571 | 28 |
| | Hsinyi Region | 239,315 | 38 |
| | Chungshan Region | 216,008 | 14 |
| Taipei County | Banchiao City | 527,996 | 30 |
| (6 regions) | Chunghe City | 396,701 | 10 |
| | Sanchung City | 381,651 | 17 |
| | Hsinchuang City | 370,819 | 33 |
| | Hsindian City | 266,862 | 35 |
| | Yunghe City | 228,241 | 29 |
| Keelung City | Keelung City | 389,189 | 19 |
| Taoyuan County | Taoyuan City | 332,146 | 21 |
| (2 regions) | Chungli City | 326,856 | 37 |

**Grand Taichung metropolitan areas**

| City/County | Region | Population* | No. of Subject |
|---|---|---|---|
| Taichung City | Beton Region | 219,990 | 34 |
| (7 regions) | Nanton Region | 124,741 | 13 |
| | Hsiton Region | 174,660 | 25 |
| | West Region | 113,190 | 20 |
| | East-Central Region | 93,391 | 18 |
| | North Region | 147,878 | 24 |
| | South Region | 95,301 | 13 |
| Taichung County | Fengyuan City | 161,361 | 38 |
| (5 regions) | Dali City | 175,804 | 29 |
| | Taiping City | 167,350 | 32 |
| | Tantsu Hsiang | 90,206 | 11 |
| | Daya Hsiang | 81,414 | 12 |
| Changhwa County | Changhwa City | 230,375 | 19 |
| (2 regions) | Yuanlin Chen | 126,766 | 15 |
| Nantou County | Nantou City | 104,377 | 42 |

Source: Department of Statistics, Ministry of the Interior, R.O.C.

*Until June, 2001

sampling, subjects were not randomly selected. The subjects could not represent and the inference could not be made for the whole population of young urbanites in Taiwan.

Questionnaires

The survey questionnaires were based on findings from previous focus group interviews. They were first written in English (see Appendix 4.1) and then translated into Chinese (see Appendix 4.2). Each question was multiple-choice except the questions relating to sensory characteristics, which were ranking questions. Six screening questions were used to ensure that the participants had experienced cheese at home and/or in restaurants within the past year, lived in these two urban areas, and were between 16 and 40 years old (see Appendix 4.3).

The questions were classified into four sections (see Appendix 4.1). The first section encompassed cheese purchasing and consumption behaviors at home and/or at restaurants. The frequencies related to general consumption, consumption occasion, and food with cheese consumed at home and/or restaurants in the past year were asked. Forms of cheese (i.e. sliced form) consumed at home were also investigated. A 4-point frequency scale (never, rarely, sometimes and often) was used except for the general consumption questions (yes-no and 8-point-scale questions). Type and package size of cheese consumed at home most often were

also included. Behavioral comparisons including consumption frequencies of home vs. restaurant, melted vs. unmelted cheese, and cheese only vs. cheese with foods were targeted. Sixteen factors, including appearance, aroma, texture, flavor, form, cheese color, package condition, package design and printing, package size, health concern, usage convenience, brand, recommendation, advertising, promotion, and price influencing subjects' decision-making when purchasing cheese was explored by using a 7-point influential scale (1= least influential and 7= most influential).

The second section was attitudes and opinions regarding cheese consumption. Cheese acceptance of subjects vs. their elders, opinions regarding fast foods (hamburger and pizza), possibility of combining cheese with Chinese foods, and degree of willingness to try new Chinese foods specially developed for cheese were explored. A 5-point agreement scale (strongly disagree, disagree, neither disagree nor agree, agree and strongly agree) was used to evaluate the 12 statements about fast foods.

Then, attitude and expectations of sensory characteristics were questioned. Subjects were first asked to rate their liking about appearance, aroma, texture and flavor by using a 7-point hedonic scale (1=dislike very much and 7=like very much). Moreover, they rated their expectation of sensory descriptors, including descriptors generated in the previous focus groups through a 5-point agreement

scale. Those descriptors were: appearance (yellow color, white color, orange color, oily, sticky, stringiness of melted cheese, glossiness of melted cheese, and steam/smoke arising from melted cheese), aroma (easily recognizable aroma, creaminess, buttery, yogurt sourness, and saltiness), texture (melted in mouth, melted in hands, powdery and grainy, chewiness, springiness, dense and viscous, moist, softness, smoothness, stringiness of melted cheese, and fineness), and flavor (cheese flavor, saltiness, dairy sourness, creaminess, buttery, milky, oily, bitterness, and bitter and sour aftertaste). Finally, they were asked to rank the importance of appearance, aroma, texture and flavor through a 4-point scale (1= most important and 4= least important).

The last section was demographics. Questions asked were: gender, age (three categories: 16-24, 25-32 and 33-40 years old), occupation (student and non-student), marital status, city of residence (Taipei and Taichung), living status (live with or without family) and kitchen availability. In addition, their behaviors regarding frequencies of grocery shopping, home cooking and dining out were also explored.

Data analysis

The data were analyzed question by question. For example, if 768 subjects gave their responses in one question, the total number of responses in this question

would be 768 although there were 793 valid surveys in total. Within a question, the number of responses given in each category was counted and the frequency of each category is reported in percentage. For the questions composed of several sub-questions (i.e. 5 sub-questions consisted in the home consumption frequency of cheese at five occasions), chi-square ($\chi^2$) analysis was used to examine whether the frequency distributions among all those sub-questions was equal. It was a valid test because the responses given in each category were observed more than five. A 5% $\alpha$-level was used to indicate significant differences. 95% confidence interval for each frequency count was also calculated. After that, frequency counts in percentage were compared and reported.

Besides chi-square analysis, the Friedman test was used to find differences from ranking data in appearance, aroma, texture and flavor. After the significant difference was found, a set of sign tests was used to run the multiple comparisons in order to identify which two ranks differed from each other (O'Mahony 1986). In each group of sub-questions relating to cheese consumption behaviors and decision-making, the correlation between two variables (ordinal categories) was determined by Spearman's correlation analysis.

# RESULTS AND DISCUSSIONS

## Subjects' demographics

793 surveys were collected and 664 of them were totally complete. Demographic information is listed in Table 4.2. 762 respondents provided their gender information. 49.9% were male and 50.1% were female. Of the subjects who provide occupation information (n=742), 53.0% were students and 47.0% were non-students. 228 respondents were between 16 and 23 years old (30.0%), 345 were between 23 and 31 years old (45.6%) and 185 were between 32 and 40 years old (24.4%). 758 subjects provided their marital status. 73.9% were single and 26.1% were married. 402 participants resided in Taipei area (53.8%) and 345 participants resided in Taichung area (46.2%). 525 subjects lived with their family (69.5%) and 230 subjects did not (30.5%). In addition, of the respondents who offered information of kitchen availability at home (n=745), 80.1% had a kitchen set up at home and 19.9% did not.

Information regarding frequencies of food shopping, home cooking and eating out within a month was explored. Near half of participants almost never shopped for their foods (n=347; 45.8%) and almost never cooked at home (n=376; 50.1%). Within "almost never cook at home", 177 subjects usually ate out and 199 subjects let others take care of cooking at home. Finally, of the respondents who offer

Table 4.2. Demographic characteristics of the respondents.

| Demographic | | n | Percent |
|---|---|---|---|
| **Gender** | Male | 380 | 49.9% |
| (Total provided n=762) | Female | 382 | 50.1% |
| **Age** | 16-23 years old | 228 | 30.1% |
| (Total provided n=758) | 24-31 years old | 345 | 45.5% |
| | 32-40 years old | 185 | 24.4% |
| **Occupation** | Student | 393 | 53.0% |
| (Total provided n=742) | Non-student | 349 | 47.0% |
| **Marital status** | Single | 560 | 73.9% |
| (Total provided n=758) | Married | 198 | 26.1% |
| **City of residence** | Taipei | 402 | 53.8% |
| (Total provided n=747) | Taichung | 345 | 46.2% |
| **Living with family** | Yes | 525 | 69.5% |
| (Total provided n=755) | No | 230 | 30.5% |
| **Kitchen availability** | Yes | 597 | 80.1% |
| (Total provided n=745) | No | 148 | 19.9% |
| **Food shopping frequency** | Every day | 50 | 6.6% |
| (Total provided n=758) | Once every 3 days | 98 | 12.9% |
| | Once a week | 154 | 20.3% |
| | Once every 2 weeks | 57 | 7.5% |
| | Once a month | 52 | 6.9% |
| | Almost never shop for food | 347 | 45.8% |
| **Home cooking frequency** | Every day | 150 | 20.0% |
| (Total provided n=750) | Once every 3 days | 70 | 9.3% |
| | Once a week | 77 | 10.3% |
| | Once every 2 weeks | 33 | 4.4% |
| | Once a month | 44 | 5.9% |
| | Almost never cook and usually eat out | 177 | 23.6% |
| | Almost never cook and others take care of cooking at home | 199 | 26.5% |
| **Eating out frequency** | Every day | 402 | 52.9% |
| (Total provided n=760) | Once every 3 days | 112 | 14.7% |
| | Once a week | 146 | 19.2% |
| | Once every 2 weeks | 41 | 5.4% |
| | Once a month | 36 | 4.7% |
| | Almost never | 23 | 3.0% |

their frequency of eating out (n=760), 83.2% of participants ate out at least once a week, including 402 participants who ate out every day. Overall, these subjects had typical urban lifestyles: less frequent food shopping and cooking but more frequent eating out (Nielson and others 1992; Tse 1994).

Subjects' behaviors of cheese purchasing and consumption

Consumption experience and frequency at home and restaurants

Subjects were first asked about their experience of cheese consumption at home and at restaurants. 64.3% respondents (n=498) had purchased cheese within the past year and then consumed it at home; however, 81.0% of these 498 subjects (n=403) indicated they did not consume cheese at home regularly. Regarding cheese consumption at restaurants, 90.0% respondents (n=690) had consumed it within the past year. It was also apparent that more subjects consumed cheese at restaurants than at home. Although near two thirds of respondents had experienced eating cheese at home, most of them did not do it regularly.

General cheese consumption frequency at home and at restaurants was explored (Table 4.3). Because some subjects only consumed cheese at restaurants, 499 subjects provided their frequency at home. 702 subjects offered their frequency at restaurants. Respondents' cheese consumption at home was low; their

Table 4.3. Subjects' consumption frequency of cheese at home and at restaurants

| Consumption frequency | Home | | Cumulative | Restaurant | | Cumulative |
|---|---|---|---|---|---|---|
| | n* | % | % | n** | % | % |
| Every day | 10 | 2.0% | 2.0% | 19 | 2.7% | 2.7% |
| Once every 3 days | 27 | 5.4% | 7.4% | 66 | 9.4% | 12.1% |
| Once a week | 61 | 12.2% | 19.6% | 158 | 22.5% | 34.6% |
| Once every 2 weeks | 35 | 7.0% | 26.7% | 93 | 13.2% | 47.9% |
| Once a month | 101 | 20.2% | 46.9% | 189 | 26.9% | 74.8% |
| Once every 3 months | 96 | 19.2% | 66.1% | 97 | 13.8% | 88.6% |
| Once every 6 months | 95 | 19.0% | 85.2% | 62 | 8.8% | 97.4% |
| Once a year | 74 | 14.8% | 100.0% | 18 | 2.6% | 100.0% |
| Total | 499 | 100.0% | | 702 | 100.0% | |

consumption frequency was mainly distributed from once a month to once a year, which accounted for 73.2% of total. Regarding subjects' consumption frequency at restaurants, it was mainly distributed from once a week to once every three months, which counted 76.4% of total. In contrast, a study surveying 3538 American subjects about their frequency of cheese consumption indicated that 23% subjects consumed cheese nearly every day (heavy users), 38% of them ate it several times a week (medium users), 15% subjects consumed it around once a week (light users), and 23% of them consumed it less than once a week (seldom/never) (DMI 1999). Thus, Taiwanese subjects consumed cheese infrequently as compared to Americans.

Consumption of cheese at restaurants was more frequent than at home. Cumulative percentages of cheese consumption frequency at home and at restaurants were calculated and compared. All seven percentages calculated from consuming cheese at restaurant were higher than from those at home. Two of them were counted at least 10% difference and three of them were counted at least 20% difference between restaurant and home consumption frequency (Table 4.3). When asked to directly compare their consumption of cheese at home versus in restaurants, over 80% of 775 respondents reported that consuming cheese was more frequent at restaurants than at home. 35.4% respondents only consumed cheese at restaurants and 47.4% of them consumed it more often at restaurants. However, 7.6% of them thought their cheese consumption frequency in both places were the

same. Only 6.8% and 2.8% of them consumed it more often at home and home only. As a result, subjects consumed cheese more often at restaurants than at home.

Frequency of consuming occasions at home and at restaurants

Subjects were asked about their frequency (never, rarely, sometimes, and often) of consuming cheese at breakfast, lunch, and dinner and as a snack or a dessert at home and/or at restaurants. Not all of subjects consumed cheese both at home and at restaurants. Thus, some subjects did not consumed cheese at home and thus they did not answer the questions regarding home cheese consumption. Between 490 and 494 subjects who had eaten of cheese at home and between 687 and 692 subjects who consumed it at restaurants provided their frequencies for the five occasions. For consumption occasions at home, chi-square analysis indicated the distributions of consumption frequency among the five occasions was significantly different ($\chi^2$=197.328; $p<0.001$; Figure 4.1). Breakfast was the most frequent occasion for consuming cheese. 14.4% subjects often consumed cheese at breakfast, which was significantly higher than the number of subjects who often consumed cheese at other occasions. 18.8% respondents never consumed cheese at breakfast, which was significantly lower than the number of subjects who never consumed cheese at other occasions. Consuming cheese as a snack and dessert was somewhat frequent and lunch and dinner was the least frequent at home. The

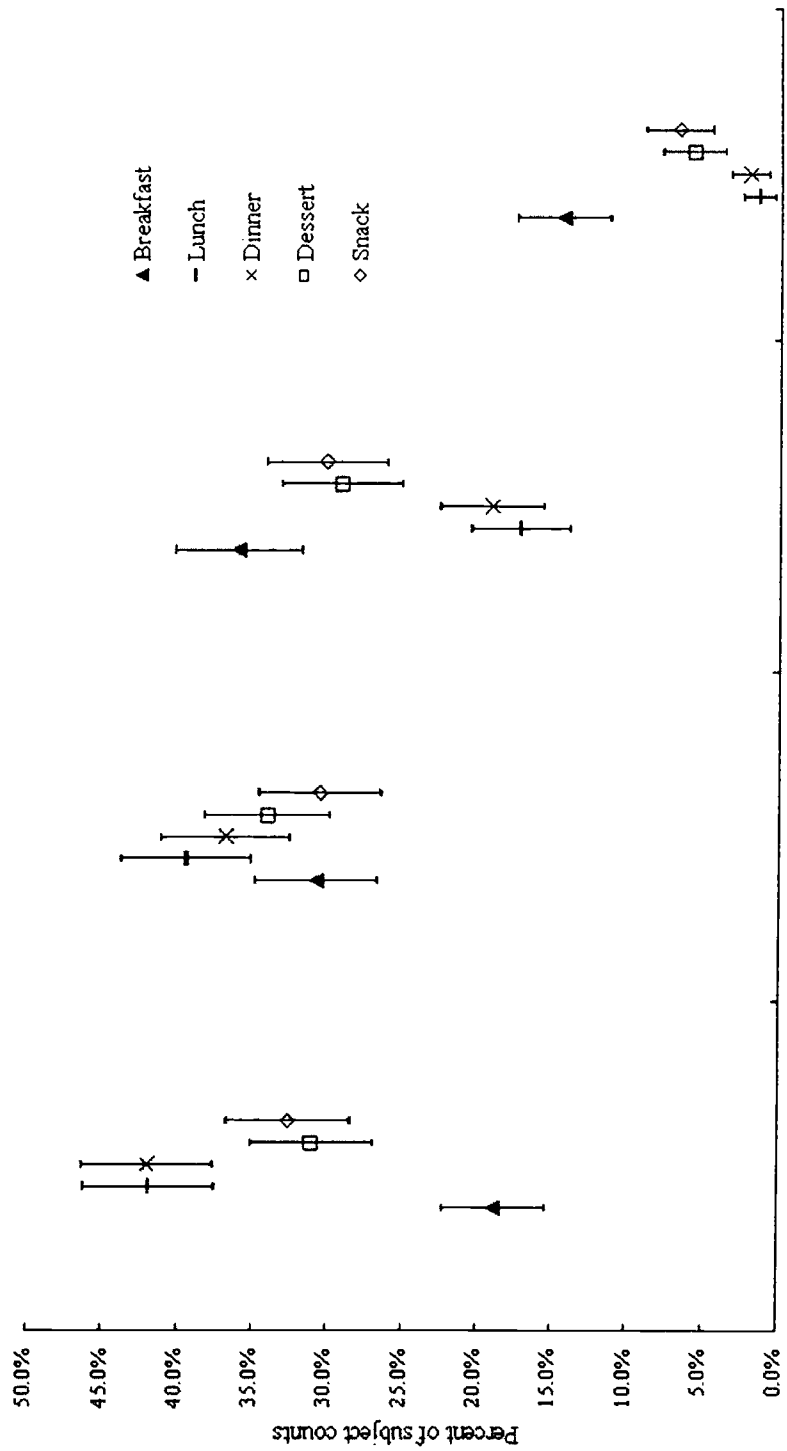


Figure 4.1. Subjects' home consumption frequency of cheese at five occasions

correlation between two occasions was explored through Spearman's correlation analysis ($\rho$). A highly positive correlation was found between lunch and dinner ($\rho$=0.68; $p<0.001$) and between snack and dessert ($\rho$=0.60; $p<0.001$).

In comparing subjects' consumption frequency at restaurants in five occasions, a significant difference existed among the distributions of consumption frequency of the five occasions ($\chi^2$=237.182; $p<0.001$; Figure 4.2). Breakfast was still the most frequent occasion to consume cheese. 14.4% of subjects consumed it at breakfast, which was significantly higher than the number of subjects who consumed it at other occasions. Unlike with home consumption, consuming cheese for lunch and dinner at restaurants was somewhat frequent and as a dessert and snack was the least frequent. Similar to the results of home consumption, Spearman's correlation analysis indicated that a highly positive correlation was found between lunch and dinner ($\rho$=0.50; $p<0.001$) and between snack and dessert ($\rho$=0.66; $p<0.001$).

Consuming cheese for breakfast was more frequent than for the other four occasions both at home and restaurants. Consuming it at lunch and dinner was somewhat frequent at restaurants but the least frequent at home. Cheese as a dessert and snack was consumed somewhat frequently at home but the least frequently at restaurants. In fact, western types of breakfasts (dairy, bread, rolls, cereal...etc.) are gaining acceptance among Asians. It was evident that the

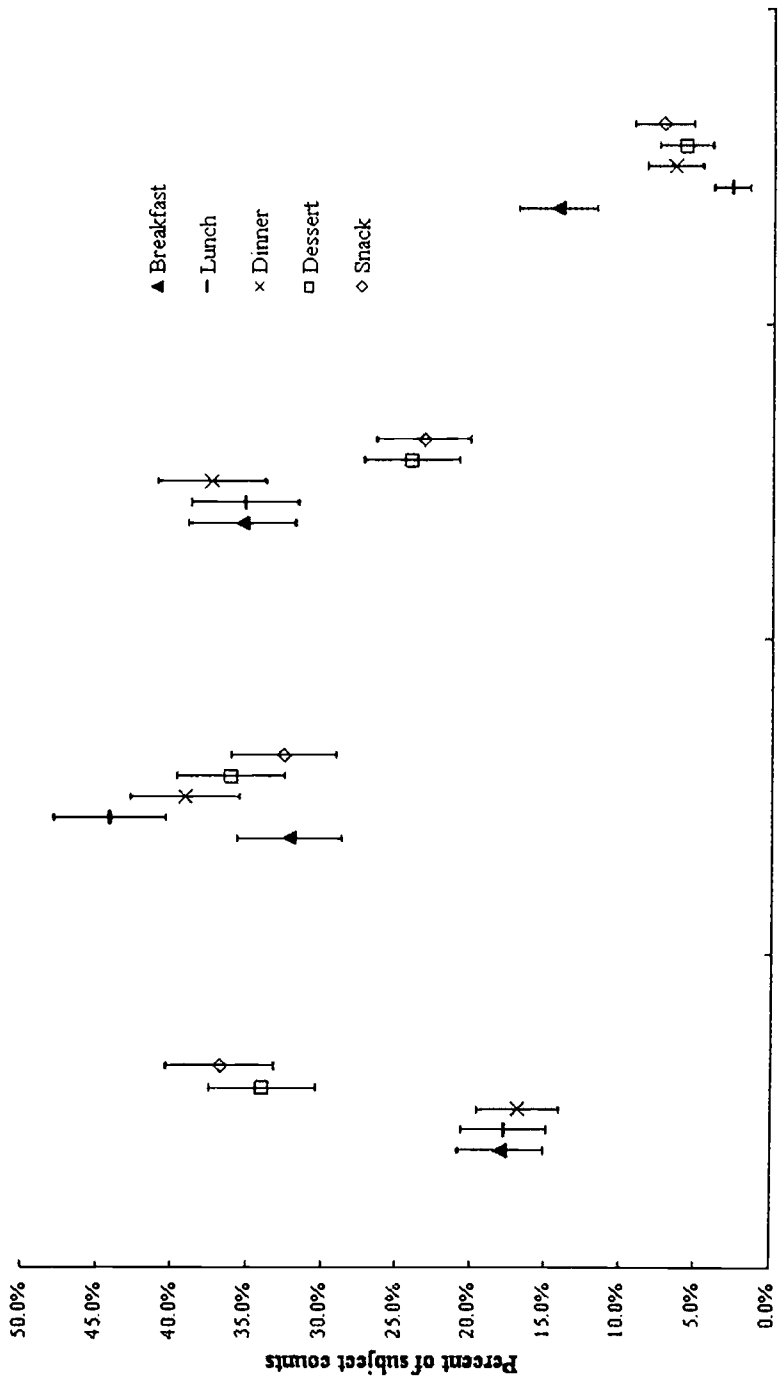


Figure 4.2. Subjects' consumption frequency of cheese at five occasions at restaurants.

Japanese consumed more bread, milk, and breakfast cereals than their traditional breakfast such as rice, noodles, and soup (Nielson and others 1992). Chau and others (1990) studied the dietary habits of immigrant Chinese elderly women living in the San Francisco Bay area. They found that subjects' exposure to American culture was limited. Chinese staple foods were consumed by 95% of subjects at lunch and dinner. However, near three fourth of them (73%) consumed American staple foods at breakfast. Another focus group study also showed that all 12 Chinese-American participants agreed that breakfast was usually westernized first (Satia and others 2000).

Traditionally, Chinese people looked down on breakfast (CCTV 2001; Pladaily 2001). Southeastern Asians also treated breakfast as a snack, not a main meal (Tong 1991; Wilson 1975). Nutritionists emphasized the importance of breakfast and health benefits of dairy products; moreover, the Chinese government encouraged the development of the dairy market because the Chinese diet was deficient in calcium generally (Access Asia 2001). Thus, western types of breakfast were gradually brought to Chinese people's attention and thus consumption of dairy products at breakfast increased.

Compared to cheese consumption at breakfast, eating it at lunch and dinner was less frequent in this study. Bertino and Chan (1986) found that the 30 Chinese subjects who resided in the U.S. around 21 months and aged from 22 to 45 years

old tended to eat convenience foods during daytime but to consume Chinese foods for dinner. Lunch and dinner were traditionally more substantial meals for the Chinese and Southeastern Asians. The meal structure might have been developed already and it was more difficult to accept western cuisine for lunch and dinner unless eating out or taking foods out from restaurants for convenience. The strong positive correlation between lunch and dinner at home and restaurants from this study revealed that subjects who consumed cheese at lunch frequently also ate it frequently at dinner. Cheese consumption at lunch and dinner should be looked at together.

Similar correlations occurred between consuming cheese as a snack and a dessert. Cheese snacks drove world cheese consumption in recent years (FAO 1999). Although consuming cheese as a dessert and a snack was not as frequent as at breakfast in this study, Olscheske (1990) pointed out that most Taiwanese and Japanese people treated cheese as a snack or dessert item rather than a meal. Cheese was an especially appropriate component of snacks in Japan (Anonymous 1999a). The nugget-size foods where the pieces are small (i.e. eaten in one bite) have gained popularity in this region (Nielson and others 1992). Bite-sized cheese has a large market potential in Pacific Asia (Asia Cuisine 2001).

Frequency of consuming eleven selected food items containing cheese at home and at restaurants

Subjects' consumption frequencies at home and/or at restaurants of 11 food items containing cheese, including cheese only, cheese sandwich, au gratin foods, pizza, hamburger, cheesecake, bagel, baguette, spaghetti, salad, and cheese with wine, were targeted. Due to not all subjects answered the questions relating to home cheese consumption, only between 492 and 497 and between 684 and 690 subjects answered the question about consumption frequency at home and at restaurant, respectively. Chi-square analysis indicated that a significant difference existed among the distributions of consumption frequency of the 11 foods at home ($\chi^2$=882.023; $p<0.001$; Figure 4.3). Cheese in a sandwich was the item most frequently consumed at home. 20.3% of respondents often and 43.1% sometimes consumed a cheese sandwich, which was significantly higher than the number of subjects often and sometimes consumed the other 10 foods. Spearman's correlation analysis revealed that there was a highly positive correlation between certain food items. Au gratin foods, frozen pizza, hamburger, cheesecake, bagel, baguette, spaghetti and salad were highly correlated to each other ($\rho \geq 0.50$; $p<0.001$), except the correlation between salad and cheesecake ($\rho=0.49$; $p<0.001$), indicating that these eight foods had a similar trend of consumption frequency. Most subjects did not frequently consume these food items at home.

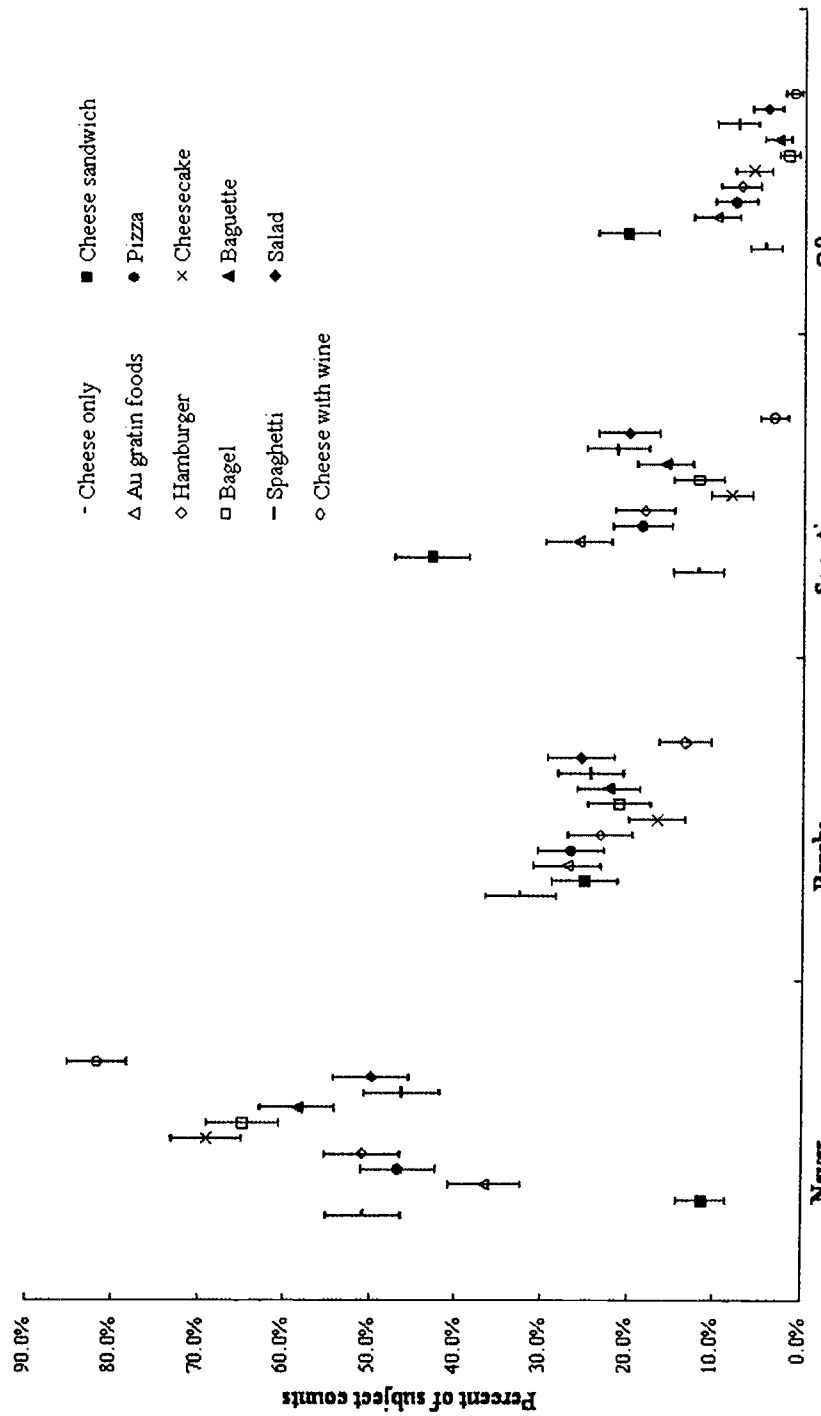


Figure 4.3. Subjects' frequencies of consuming the 11 selected food items containing cheese at home.

Subjects who have consumed cheese at restaurants within a year were questioned about their frequency of consuming the selected 11 food items containing cheese at restaurants. A significant difference existed among the distributions of consumption frequency of the 11 foods, supported by chi-square analysis ($\chi^2$=2466.905; $p<0.001$; Figure 4.4). Cheese sandwiches, pizzas, hamburgers, au gratin foods, cheesecakes and spaghetti were consumed most frequently at restaurants. The number of subjects who often and sometimes consumed these six foods was significantly higher than the number of subjects often and sometimes eating cheese only, bagel, baguette, salad, and cheese with wine, respectively. In contrast, the number of subjects never eating these six foods was significantly lower than the number of subjects never consuming the other five foods. The consumption frequencies of certain food items at restaurants were highly positively and significantly ($\rho \geq 0.50$; $p<0.001$) correlated. The findings were supported by Spearman's correlation analysis. Au gratin foods, pizza, cheesecake and spaghetti were highly associated with each other. Respondents who consumed any of them were likely to consume the rest of them. Pizza and hamburger ($\rho$=0.63), baguette and bagel ($\rho$=0.59), and spaghetti and salad ($\rho$=0.54) were also highly correlated to each other.

Looking closely at the subjects' consumption frequency of these food items, "cheese only" was one of the foods subjects consumed least frequently (Figure 4.3 and 4.4). The choice of subjects eating cheese only and cheese with other food

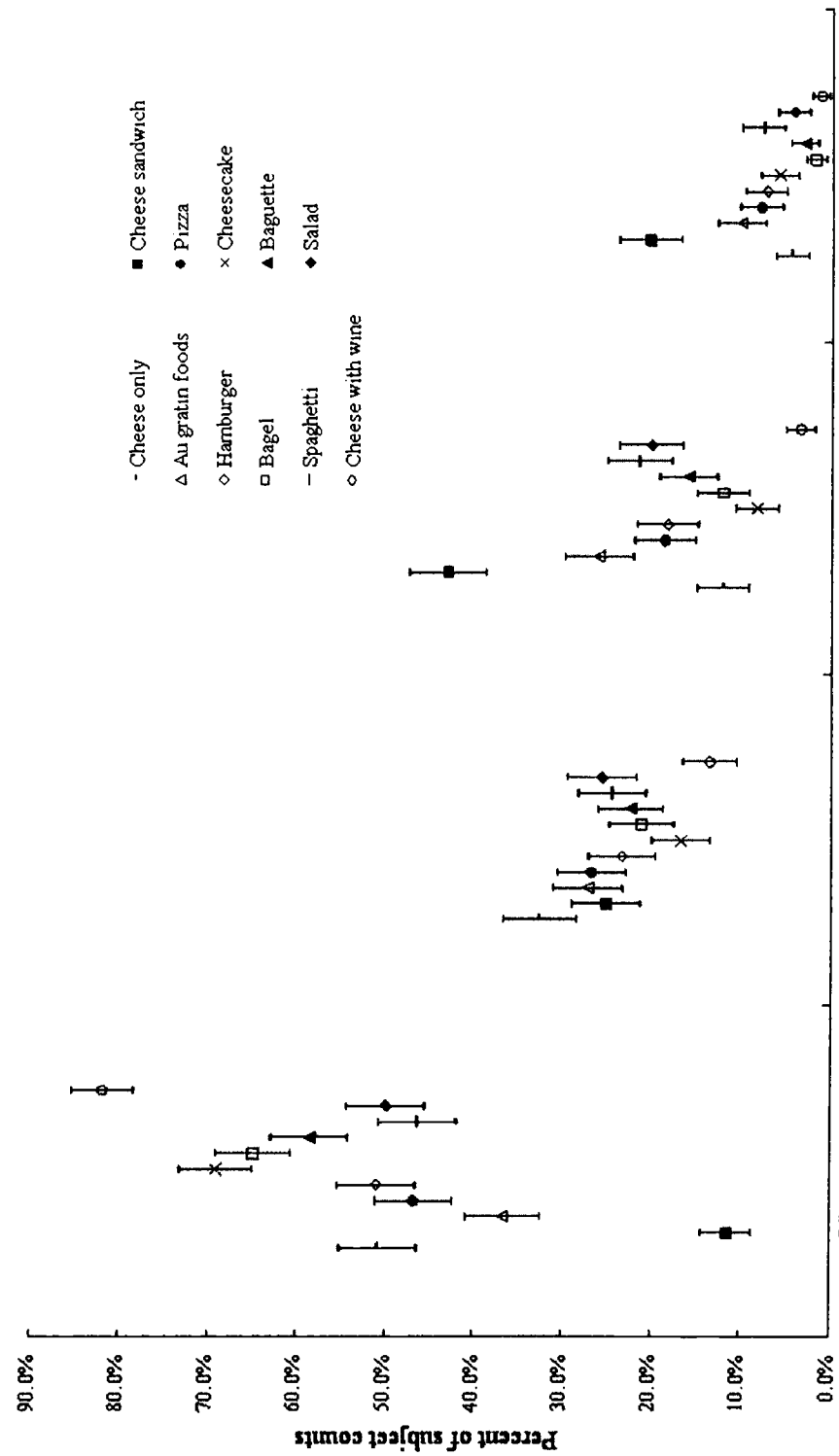


Figure 4.4. Subjects' frequencies of consuming the 11 selected food items containing cheese at restaurants

items was further investigated. Over 80% of 772 respondents consumed cheese with other food items more frequently than by itself. 28.1% of the respondents consumed cheese with other foods only and 58.3% consumed cheese with foods more frequently than by itself. 8.4% consumed cheese with foods as frequently as by itself; in addition, 4.0% consumed cheese with foods less frequently than cheese only and 1.2% only consumed cheese by itself.

Another point was brought out when further observing subjects' consumption frequency of the 11 selected food items. Consumption frequency of food items usually containing unmelted cheese such as "cheese only", "cheese with wine", and salad was relatively lower than consumption frequency of food items usually containing melted cheese such as "pizza", "hamburger", and "au gratin foods". Thus, all subjects were asked to compare their consumption frequency of melted and unmelted cheese and 774 of them responded. Near 60% of the respondents consumed melted more frequently than unmelted cheese. 20.8% of the respondents consumed melted cheese only and 37.9% consumed melted more than unmelted cheese. 31.5% consumed melted as frequent as unmelted cheese. Only 6.2% consumed melted cheese less frequently than unmelted cheese and 3.6% consumed only unmelted cheese.

A cheese sandwich was consumed most frequently at home and at restaurants. There are various kinds of cheese sandwiches. At home and/or at a restaurant, it

may be served with egg and ham or tuna, or even vegetables. The cheese melts slightly because of its proximity to the other hot ingredients. The bread is usually toasted; sometimes the sandwich is made with a steam bun. Consumption frequency of a cheese sandwich was not associated with the consumption frequency of the other food items. This revealed its uniqueness. A cheese sandwich was also the most popular homemade food item containing cheese in Japan (Wanatabe and others 1997). According to the results from the previous focus group study (Chapter III), making a cheese sandwich at home was considered simple, convenient, and quick and a cheese sandwich was usually consumed at breakfast. A cheese sandwich was a popular food item both at home and at restaurants. In Taiwan, various kinds of sandwiches are available in most breakfast restaurants (or take-out) and their price is much cheaper than breakfast sold in fast food restaurants. Also, breakfast restaurants are usually more distributed in neighborhoods than fast food restaurants. In fact, Taiwanese people hurry to go to school or work every day and their lunchtime is usually one hour on average. Thus, quick, easily-made, and easily-accessed foods are necessary for breakfast and lunch and a cheese sandwich is a good choice.

Besides consumption of cheese sandwiches at home and at restaurants, the consumption frequency of au gratin foods, pizza, hamburger, and cheesecake was high at restaurants. Subjects participating in focus groups also mentioned they did not know how to cook with cheese at home. Thus, it might explain why

consumption of these foods was more frequent at restaurants than at home. Moreover, it might explain why more subjects experienced cheese at restaurants than at home and subjects consumed cheese at restaurants more frequently than at home. Consuming cheese with wine was infrequent. However, wine has gained popularity in Taiwan in the past ten years. In 2000, Taiwan imported about 132.45 million liters of French wine and there were about 800 wine importers. After Taiwan joined the WTO, the tariff of wine was reduced to 10% in 2002 (Wu 2001). In addition, the tariff on wine in China will reduce from 65% to 14% by 2004 (Boone 2002). Wine importers started to educate people on which food to eat with selected wine. Cheese was one of their major emphasized foods. Thus, cheese with wine is expected to be popular in Taiwan and China in the future.

When further looking at the results, the subjects' consumption frequencies of cheese only vs. cheese with other foods and melted vs. unmelted cheese were compared. Over 80% of the respondents consumed cheese with foods and over 50% of subjects consumed melted cheese. Based on the previous focus groups (Chapter III), melted cheese with foods is commonly consumed. Cheese only or unmelted cheese was rare. 24 of 25 focus group subjects never thought cheese could be eaten alone because their experience of cheese mainly involved fast foods, Italian cuisine, cheesecake, and sandwiches. Also, they thought cheese was a condiment. Etesse (1998) pointed out that cheese was increasingly consumed as an ingredient in Pacific Rim Asia although the direct cheese consumption at home

and at restaurants still remained low. This was consistent with the subjects' cheese consumption behavior in this study. On the other hand, the Chinese traditionally consumed more hot than cold foods. Based on this, subjects in focus groups thought unmelted cheese was raw and inedible and melted cheese was cooked and safe.

Consuming the selected cheese types at home

504 subjects who consumed cheese at home within a year responded to the question "what types of cheese do you consume at home most often". 61.7% of subjects reported they did not know the cheese type they ate. 19.4% of them knew they consumed cream cheese most often. Cream cheese has obtained some recognition. Other cheese types, including processed (5.0%), American (6.0%), Cheddar (2.8%), Monterey Jack (0.8%), Colby (0.2%), Swiss (2.6%), Mozzarella (1.0%) and Parmesan (0.6%), were rarely chosen. Thus, it was apparent that most respondents did not know what types of cheese they consumed at home. Olscheske (1990) reported that the Taiwanese did not know the cheese types that were available in the market at that time. Even now subjects' knowledge about cheese is still quite limited.

Consumption frequency of the selected cheese forms and package sizes at home

494 to 502 participants who consumed cheese at home within the past year responded to the questions relating to their consumption frequency of the selected cheese forms used at home. Chi-square analysis showed that a significant difference existed among the 7 distributions of consumption frequency of cheese forms ($\chi^2$=535.411; $p<0.001$; Figure 4.5). Sliced cheese was the most frequently form of cheese consumed at home. 24.9% respondents expressed that they often consumed sliced cheese at home; however, less than 7% of them often consumed the other 6 cheese forms. Only 15.1% respondents never consumed sliced cheese, but over 42.8% of them never consumed the other 6 cheese forms. Spearman's correlation analysis indicated that consumption of grated cheese, cheese bar, chunk cheese, and candy-like cheese was highly positively associated with each other ($\rho \geq 0.50$; $p<0.001$). Respondents who consumed shredded cheese were more likely to consume grated cheese ($\rho=0.59$; $p<0.001$) and chunk cheese ($\rho=0.52$; $p<0.001$). The respondents who consumed cheese spread were more likely to consume chunk cheese ($\rho=0.55$; $p<0.001$) and cheese bar ($\rho=0.54$; $p<0.001$). These correlations indicated except sliced cheese, the other cheese forms had similar consumption trends. Subjects did not consume them very often.

The previous focus group study (Chapter III) indicated that using sliced cheese for any cooking had the same advantages (simple, easy, and quick) as for making

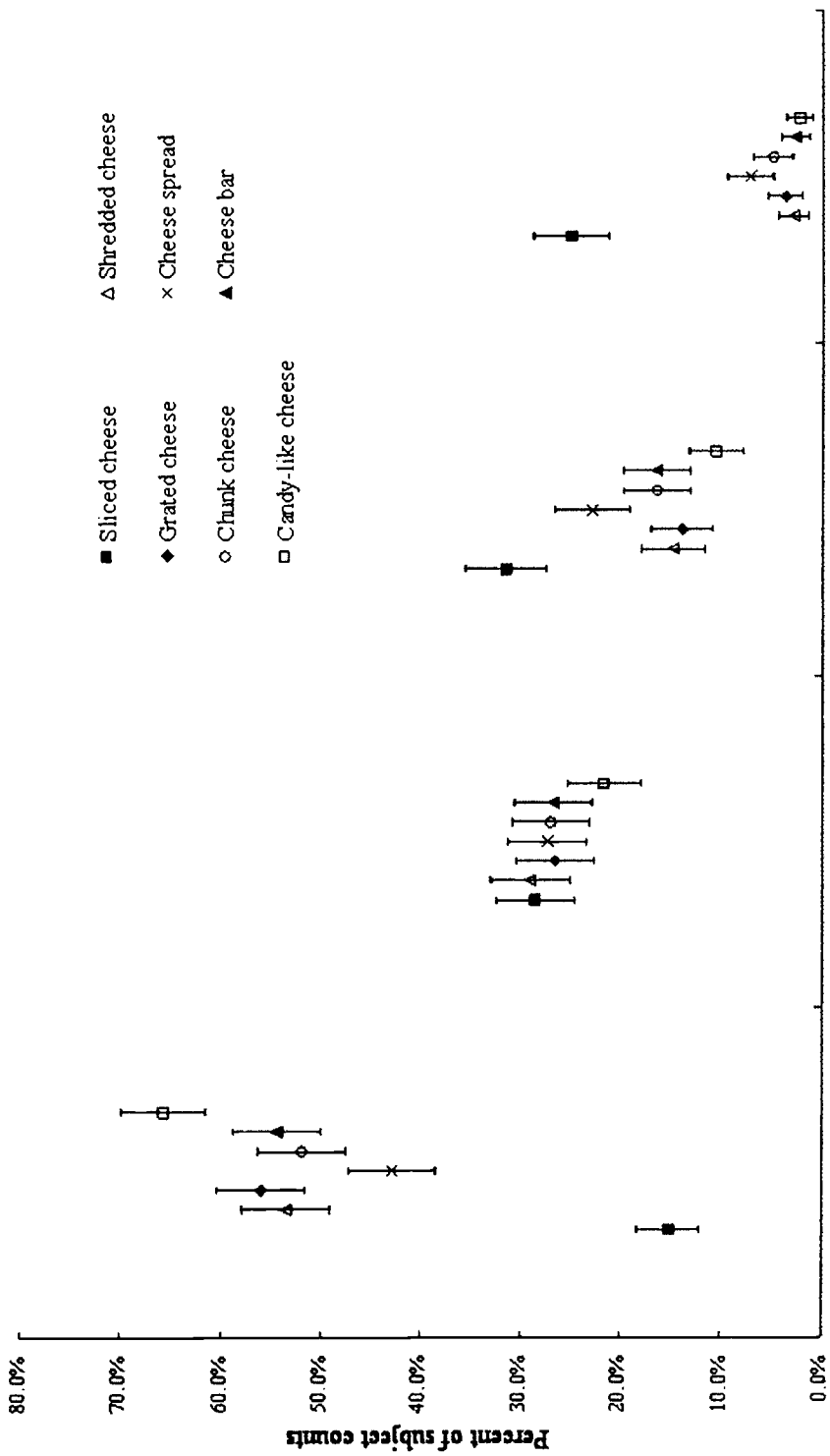


Figure 4.5. Subjects' home consumption frequency of cheese forms

cheese sandwiches at home. Furthermore, its size was suitable for making sandwiches and it was available in most convenient stores, department stores, hypermarkets, and supermarkets. In Taiwan, it was well known and continued to be consumed extensively. Besides Japanese and Taiwanese consumers, Hong Kong consumers preferred sliced cheese and used it for making a sandwich (Olscheske 1990). In South Korea, sliced cheese was also the most popular (Stringer 2000). Olscheske (1990) pointed out the great market potential of shredded and grated cheese if they were tied with selling frozen pizza. However, the results in this study still showed very low consumption frequency of pizza (Figure 4.3) and these two forms of cheese (Figure 4.5) at home. It was possibly because pizza was often eaten at or ordered from restaurants. The market for frozen pizza was still limited due to the limited availability of an oven at a typical Chinese home.

504 subjects who consumed cheese at home reported the package sizes of cheese consumed the most frequently at home. 87.5% of them consumed a small size (less than 500g or 12 slices) most often. Only 11.3% and 1.2% respondents consumed medium and large sizes of cheese most often. As compared with the food portions in the U.S., those in Pacific Rim Asia were much smaller (Nielson and others 1992). The Chinese are frugal and they always avoid wasting anything. Therefore, Chinese people are likely to consume smaller food portions and purchase small amount of foods (Olscheske 1990). Taiwanese consumers liked

small, single serving size packages. When trying a new food, they liked to purchase the smallest size (Henke 1996). Also, people would not purchase a bigger package without knowing how to use cheese or cook with it. Chinese people think freshness and quality of foods is extremely important. Traditionally they (especially housewives) shopped daily in wet markets to obtain fresher and better quality foods (Olscheske 1990; Tse 1994). Thus, they would rather purchase the smallest package of cheese in order to be sure of its "freshness". Food was consumed within two days of purchase and usually leftovers were not kept (Nielson and others 1992). All participants in the previous focus groups (Chapter III) preferred a small size because they did not have to worry about cheese spoiling in their refrigerator.

Factors influencing decision-making when subjects purchase cheese in supermarkets or other types of grocery stores

All subjects were asked what influenced their decision making when purchasing cheese among the 16 product characteristics generated from the previous focus groups by using a 7-point category scale (1=not at all influential and 7=very influential). 760 to 765 subjects responded. The seven influential levels were reduced to three categories (low, somewhat, and highly influential) and then analyzed by chi-square. A significant difference ($\chi^2$=1195.285; $p<0.001$; Figure 4.6) was found among the distributions of three categories of all 16 characteristics.

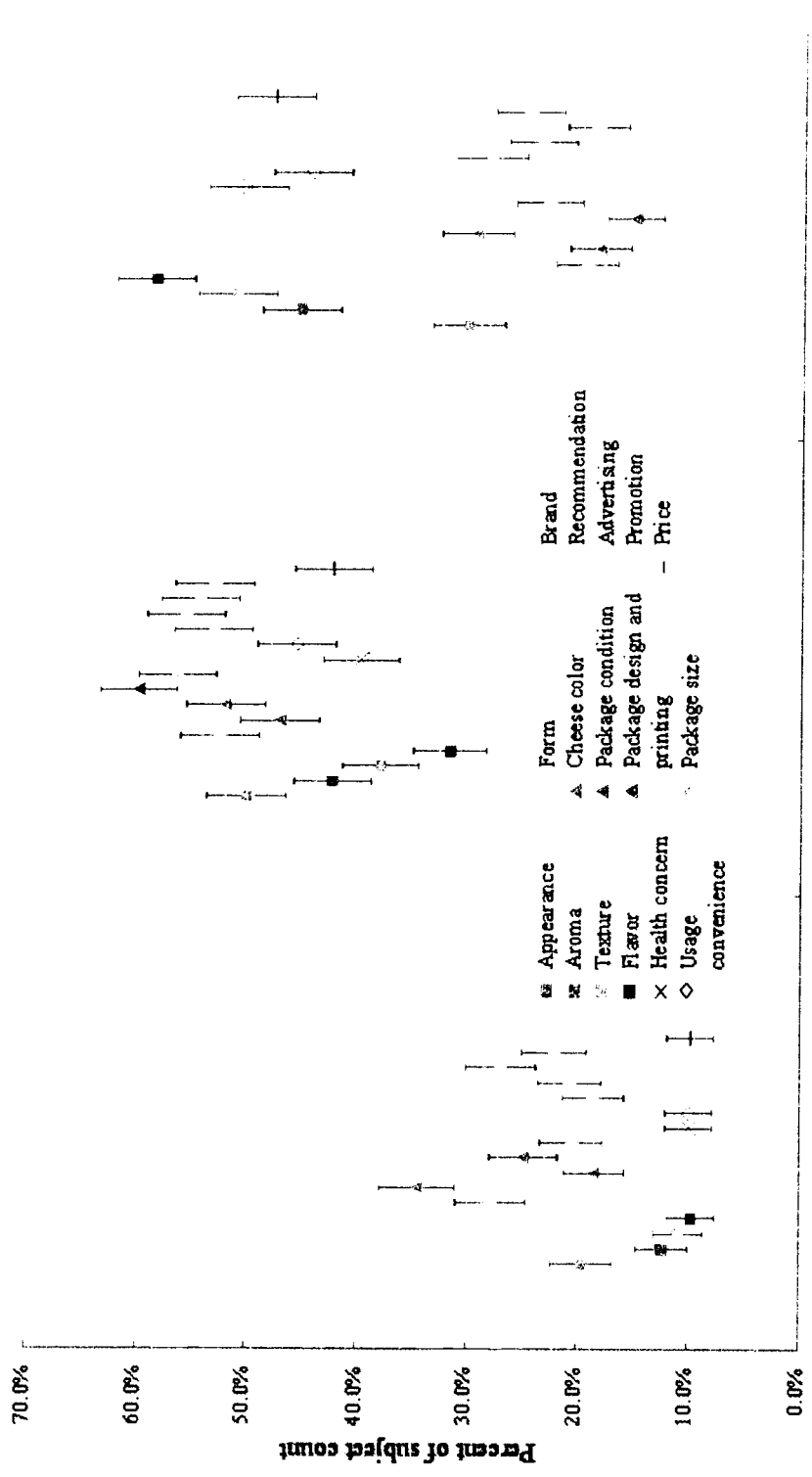


Figure 4.6. Influence on decision-making of the 16 product characteristics when subjects purchase cheese in supermarkets.

These characteristics could be divided into two groups based on the degree of influence of decision-making. The first group, including aroma, texture, flavor, usage convenience, health concern, and price, had the highest degree of influence. By comparing them with the other factors, they were given more responses in "highly influential" but fewer responses in "low influential".

The second group of purchase decision making criteria contained appearance, form, cheese color, package condition, package design and print, package size, brand, recommendation, advertising, and promotion. These 10 product characteristics had a relatively lower influence on subjects' decision-making than sensory attributes, health concern, price, and usage convenience. Around half of subjects' (from 47.1% to 59.9%) thought they were "somewhat influential". Fewer subjects thought they were either "highly" or "lowly" influential (Figure 4.6). Thus, all 16 product characteristics either strongly or somewhat influence subjects' decision-making when purchasing cheese.

When looking at the six higher influential characteristics, three of the four sensory characteristics, aroma, texture and flavor, were included. Several studies indicated that among all attributes regarding food purchasing and consumption, the sensory attributes were more important than non-sensory ones (Peryam 1963; Szczesniak and Kleyn 1963). Moskowitz and Chandler (1978) found that flavor was more important than nutritional quality and cost across a variety of foods.

Vickers (1993) examined how taste, brand, price and health claim influenced consumers' purchase intent of strawberry yogurt. She found that taste and health claim affected the purchase intent strongly but the influence of brand was small. Taste was also considered relatively more important than health for consuming imported cheese in Japan (Wanatabe 1999). Therefore, Henke (1996) and Tse (1994) suggested that exporters should target taste preferences of the Chinese because it was very different from the North American taste.

Health concern was also an important factor. This was expected, as Chinese are always aware of the health benefits of dairy products (Access Asia 2001). Nevertheless, a suspicion that consuming too much cheese would result in weight increase was widely accepted by Taiwanese. High calorie and cholesterol content of cheese are of concern (Olscheske 1990). Commercial advertisements produced by NZDB have emphasized, "one pack of cheese is made with twelve glasses of milk" in order to enhance the image of cheese in Taiwan. They also used the healthy image of New Zealand and focused on Asians' natural concern toward foods (Gasson 1995). Lactose intolerance was another concern (Griffin 1995). 60%-70% Asians have this problem (Quak and Tan 2002) and thus could not consume dairy products. However, slowly increasing milk consumption along with moderately consuming yogurt help produce lactate, the enzyme breaks down lactose in gastrointestinal tract (Gilbert 2002; NDA 2002). The School Milk Programmes has been conducted by Food and Agriculture Organization of the

United Nations (FAO) and supported by some Asian governments such as China, Thailand, the Philippines and Indonesia (Griffin 2002). If Asians could develop their milk drinking habits, the number of Asians affected by lactose intolerance would be reduced in near future.

Price also highly influenced subjects' cheese purchasing. According to the previous focus group study (Chapter III), a middle price was preferred by typical Chinese consumers because of the tradition to not purchase anything too cheap or too expensive. In addition, the Chinese are willing to pay a high price to get better quality foods (Anonymous 1999b; Olscheske 1990). The aspect of usage convenience was also emphasized. Dual-income families usually have less time to shop for and cook foods. Most subjects in this study showed low frequency of food shopping and cooking. Convenience is emphasized in today's market in Taiwan (Anonymous 1999b). Zhang and others (1999) also found that convenient, high quality foods were desired by Chinese people.

Packaging had a certain influence in the decision-making of purchasing cheese in this study. Consumers in Pacific Rim Asia thought that food packaging was extremely important. A package that was clean, transparent, new, innovative, colorful, and constantly changing was highly regarded (Nielson and others 1992). A unique package can also help build brand recognition (Griffin 1999). Packaging labels should be both in English and Chinese (Henke 1996; Tse 1994);

for example, "made in U.S.A." or "U.S. products" would attract consumers to purchase. Results from the previous focus group (Chapter III) study also found that the best package was transparent and vacuum packed. Hong Kong consumers thought a cheese package should be designed and attractive as well as hygienic. Individually wrapped cheese, especially for sandwiches, was also considered important (Olscheske 1990).

Similar to the influence of packaging, brand and promotion influenced subjects' decisions regarding cheese purchasing. According to Griffin (1999), Asian consumers were allured by the brands which had known quantity and representative quality. Therefore, building brand awareness and loyalty was essential. Kraft Foods, Inc. regularly advertised their cheeses through TV and magazines in order to establish consumers' brand loyalty in Hong Kong (Olscheske 1990). NZDB believed that their success in Asian dairy markets was strongly tied with building brand leadership. They announced that 70% of their investments in Asia will be linked with brands (Gasson 1995). The previous focus group study (Chapter III) mentioned that brand should be known because brand could reflect quality. In fact, subjects might not be familiar with cheese brands since their home cheese consumption was low. This might be a reason why brand was not the most influential factor.

Cheese importers in Taiwan believe that selling cheese in Taiwan must depend on promotion (Olscheske 1990). Taiwanese consumers also expressed that promotions in supermarkets play an important role for their purchasing decisions (Henke 1996). Hong Kong importers promote cheese consumption by using sample tasting in hotels or at restaurants. In-store promotions in Hong Kong conducted by Mid America International Agri-Trade Council (MIATCO) benefited several U.S. cheese companies (Olscheske 1990).

Among the 16 product characteristics affecting purchasing decisions, sensory attributes, such as appearance, aroma, texture, and flavor were highly and positively correlated with each other ($\rho \geq 0.50$; $p < 0.001$). Visual factors, such as form, cheese color, package condition, package design and printing and package size, were grouped with each other with correlations above 0.5, and marketing factors, including brand, recommendation, advertising and promotion, were correlated (Table 4.4). Thus, subjects' decisions could be divided into three categories, the sensory-oriented, the visual-oriented and the marketing-oriented. In other words, if participants' decisions of purchasing cheese were influenced by cheese flavor, their decisions would be also affected by other sensory characteristics. However, due to a possible order effect, correlation results might be different if the order of the 16 product characteristics were changed in another survey. In all, the findings of cheese purchasing and consumption behaviors were consistent with the previous focus group findings.

Table 4.4. Spearman's correlation coefficients of the pairs of 16 factors affecting subjects' decision-making when purchasing cheese.

| | Appearance | Aroma | Texture | Flavor | Form | Cheese color | Package condition | Package design and printing | Package size |
|---|---|---|---|---|---|---|---|---|---|
| **Appearance** | 1.00 | 0.69 | 0.59 | 0.54 | 0.46 | 0.44 | 0.50 | 0.53 | 0.40 |
| **Aroma** | 0.69 | 1.00 | 0.69 | 0.64 | 0.37 | 0.34 | 0.44 | 0.42 | 0.36 |
| **Texture** | 0.59 | 0.69 | 1.00 | 0.74 | 0.36 | 0.30 | 0.44 | 0.41 | 0.38 |
| **Flavor** | 0.54 | 0.64 | 0.74 | 1.00 | 0.36 | 0.27 | 0.43 | 0.37 | 0.38 |
| **Form** | 0.46 | 0.37 | 0.36 | 0.36 | 1.00 | 0.63 | 0.48 | 0.55 | 0.53 |
| **Cheese color** | 0.44 | 0.34 | 0.30 | 0.27 | 0.63 | 1.00 | 0.51 | 0.54 | 0.46 |
| **Package condition** | 0.50 | 0.44 | 0.44 | 0.43 | 0.48 | 0.51 | 1.00 | 0.62 | 0.52 |
| **Package design and printing** | 0.53 | 0.42 | 0.41 | 0.37 | 0.55 | 0.54 | 0.62 | 1.00 | 0.65 |
| **Package size** | 0.40 | 0.36 | 0.38 | 0.38 | 0.53 | 0.46 | 0.52 | 0.65 | 1.00 |
| **Health concern** | 0.38 | 0.43 | 0.52 | 0.48 | 0.30 | 0.32 | 0.45 | 0.44 | 0.41 |
| **Usage convenience** | 0.42 | 0.41 | 0.48 | 0.47 | 0.36 | 0.29 | 0.46 | 0.45 | 0.47 |
| **Brand** | 0.38 | 0.37 | 0.41 | 0.42 | 0.45 | 0.40 | 0.46 | 0.44 | 0.41 |
| **Recommendation** | 0.36 | 0.33 | 0.35 | 0.37 | 0.35 | 0.34 | 0.38 | 0.41 | 0.38 |
| **Advertising** | 0.36 | 0.28 | 0.28 | 0.30 | 0.40 | 0.39 | 0.37 | 0.43 | 0.37 |
| **Promotion** | 0.37 | 0.30 | 0.33 | 0.33 | 0.35 | 0.30 | 0.38 | 0.42 | 0.37 |
| **Price** | 0.35 | 0.37 | 0.36 | 0.35 | 0.36 | 0.31 | 0.33 | 0.36 | 0.37 |

| | Health concern | Usage convenience | Brand | Recommendation | Advertising | Promotion | Price |
|---|---|---|---|---|---|---|---|
| **Appearance** | 0.38 | 0.42 | 0.38 | 0.36 | 0.36 | 0.37 | 0.35 |
| **Aroma** | 0.43 | 0.41 | 0.37 | 0.33 | 0.28 | 0.30 | 0.37 |
| **Texture** | 0.52 | 0.48 | 0.41 | 0.35 | 0.28 | 0.33 | 0.36 |
| **Flavor** | 0.48 | 0.47 | 0.42 | 0.37 | 0.30 | 0.33 | 0.35 |
| **Form** | 0.30 | 0.36 | 0.45 | 0.35 | 0.40 | 0.35 | 0.36 |
| **Cheese color** | 0.32 | 0.29 | 0.40 | 0.34 | 0.39 | 0.30 | 0.31 |
| **Package condition** | 0.45 | 0.46 | 0.46 | 0.38 | 0.37 | 0.38 | 0.33 |
| **Package design and printing** | 0.44 | 0.45 | 0.44 | 0.41 | 0.43 | 0.42 | 0.36 |
| **Package size** | 0.41 | 0.47 | 0.41 | 0.38 | 0.37 | 0.37 | 0.37 |
| **Health concern** | 1.00 | 0.57 | 0.43 | 0.40 | 0.34 | 0.38 | 0.42 |
| **Usage convenience** | 0.57 | 1.00 | 0.49 | 0.38 | 0.33 | 0.35 | 0.43 |
| **Brand** | 0.43 | 0.49 | 1.00 | 0.55 | 0.53 | 0.47 | 0.36 |
| **Recommendation** | 0.40 | 0.38 | 0.55 | 1.00 | 0.66 | 0.60 | 0.41 |
| **Advertising** | 0.34 | 0.33 | 0.53 | 0.66 | 1.00 | 0.72 | 0.41 |
| **Promotion** | 0.38 | 0.35 | 0.47 | 0.60 | 0.72 | 1.00 | 0.56 |
| **Price** | 0.42 | 0.43 | 0.36 | 0.41 | 0.41 | 0.41 | 1.00 |

2-tailed significance was less than 0.001.

Correlation was significant at the 0.01 level (2-tailed).

Subjects' attitudes and opinions regarding cheese consumption

Agreements regarding fast foods (hamburger and pizza)

Subjects showed different degrees of agreement regarding the 12 statements about fast foods. From 762 to 765 subjects answered the questions. The 5 agreement levels of each question were shrunk into 3 categories (accept, neutral, and reject) and chi-square analysis showed there was a significant difference ($\chi^2$=1287.717; $p<0.001$; Figure 4.7) among the distributions of these 3 categories of 12 statements. The 7 statements, including "pizza is delicious", "a cheeseburger is delicious", "fast food is convenient", "young adults, teenagers, and children go to fast food restaurants often", young adults, teenagers and children are attracted by toys inside or with the combo package", "fast food restaurants are good for having fun with friends for young adults and teenagers", and "fast food restaurants have a children's entertainment area", obtained the highest agreement. The 4 statements, such as "cheese is one of the reasons to consume fast foods", "eating fast foods is fashionable", "fast food restaurants welcome students to discuss assignments" and "the environment of fast food restaurants is relatively simple and safe", obtained only partial agreement. "The advertising of fast foods emphasizes the presence of cheese" obtained the lowest agreement.

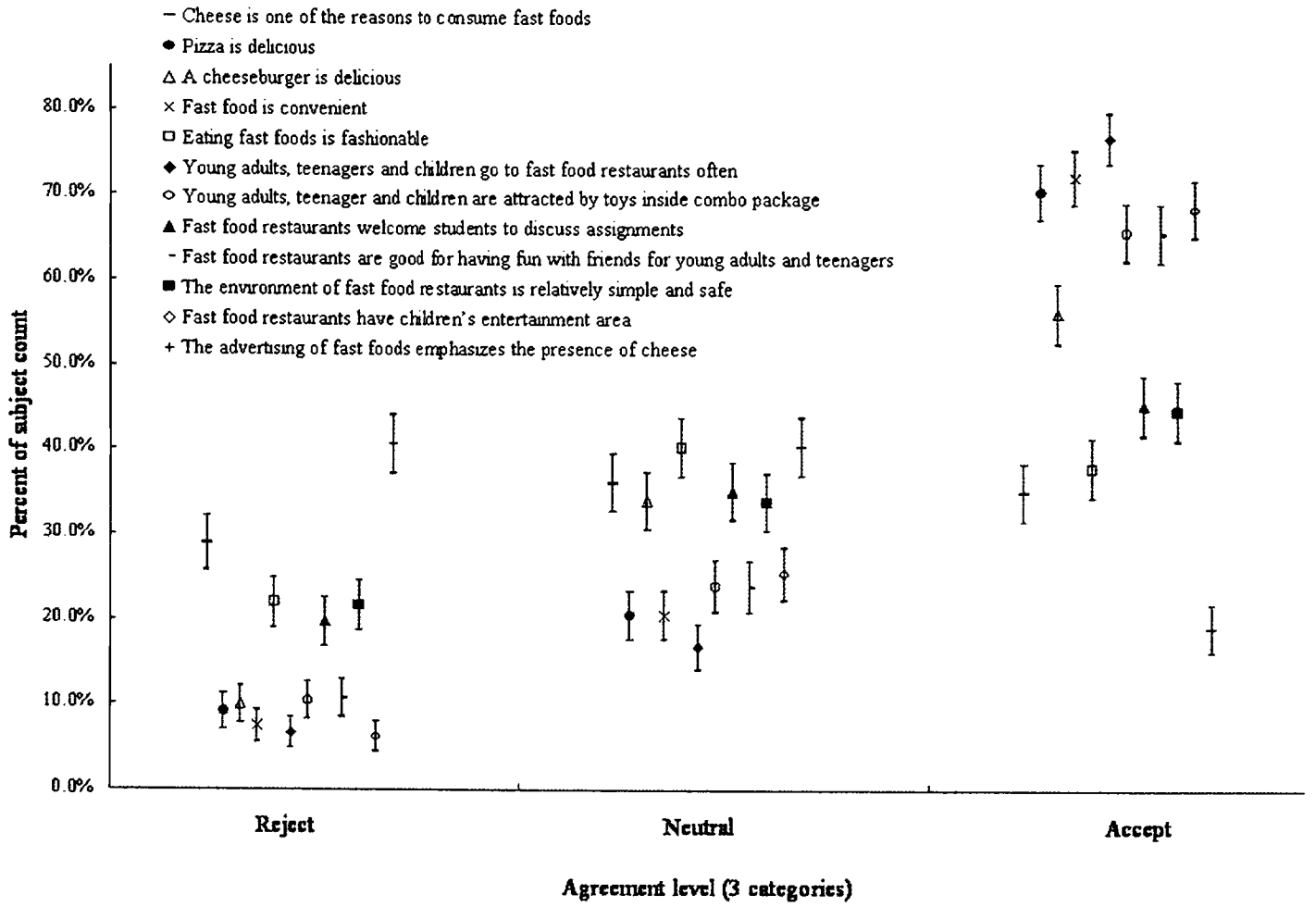


Figure 4.7. Comparison of subjects' attitudes about fast foods.

"Young adults, teenagers, and children go to fast food restaurants often" obtained the highest agreement; 76.5% subjects agreed or strongly agreed. A high percentage of the population consuming fast foods is teenagers because they were more open to changing their eating habits (Chou and Liu 1999). Chou and Liu (1999) also pointed out that convenience is the key quality characteristic of fast food restaurants and is emphasized in modern societies. "Fast food is convenient" obtained the second highest agreement; 72.0% of subjects agreed or strongly agreed with that statement. People enjoyed the convenience of fast foods and thus their consumption was high. "Pizza is delicious" obtained the third highest agreement in this study; 70.3% subjects showed their agreement (Figure 4.7). In 1990, Olscheske mentioned that pizza was the most quickly growing western food in Taiwan. It was expected to have a great market potential because consumers rapidly accepted some western toppings (i.e. pepperoni) and more traditional Chinese toppings (i.e. Peking Duck and seafood). Thus, pizza has gained a lot of popularity and acceptance in Taiwan in the past 10 years.

"A cheeseburger was delicious" was also relatively accepted as a statement by subjects. 56.0% of subjects accepted this statement but 34% of subjects gave a neutral response to it. Its degree of agreement was significantly lower than "pizza is delicious" (Figure 4.7). "Pizza is delicious" and "a cheeseburger is delicious" was also highly and significantly correlated ($\rho=0.63$; $p<0.001$). A survey conducted in 12 major cities in China showed that 80% of the total respondents

indicated they liked western fast foods (Anonymous 1999a). Therefore, fast foods were perceived not only as convenient, but also as delicious. These findings were not consistent with the previous focus group studies of Taiwanese students because focus group subjects agreed that fast foods are convenient but not delicious.

The 5 statements relating to marketing strategies of fast food restaurants acquired high and medium agreements from subjects. "Fast food restaurants have a children's entertainment area", "young adults, teenagers and children are attracted by toys inside or with the combo package", and "fast food restaurants are good for having fun with friends for young adults and teenagers" reached a relatively high degree of agreement; over 60% of subjects agreed or strongly agreed with them. "Fast food restaurants welcome students to discuss assignments" and "the environment of fast food restaurants is relatively simple and safe" were somewhat accepted statements; around 45% subjects accepted them and about 35% subjects gave neutral responses (Figure 4.7). The strategies that focused on younger generations were well accepted. These strategies might be the true reasons that caused the high frequency of consuming fast foods among children, teenagers and young adults.

Subjects' opinions regarding the safety of fast food restaurants were not consistent with findings from the previous focus group studies. The focus group participants felt that parents viewed fast food restaurants as safer for their children than other

social gathering spots. However, recent spiking of drugs into fast food drinks by consumers and given to other consumers has raised alarm. Plus several kidnappings of small children occurred. The safety issues of fast food restaurants would require more attention by restaurant managers. Fast food restaurants were not very attractive to students by allowing them to discuss homework. These issues were also not consistent with the previous focus group findings. The attitude of fast food restaurants regarding accepting students to discuss homework assignments was also viewed differently between survey and focus group subjects. The time interval between the first focus group study and the second consumer survey was 8 months. Fast food restaurants' policy and attitude might change within this time period and that might result in the inconsistency of the two findings.

"Eating fast foods is fashionable" was a somewhat accepted statement (Figure 4.7). 37.8% of subjects responded that they agreed or strongly agreed and a similar amount of subjects (40.3%) gave neutral responses. Fast foods have gained popularity in Taiwan for over the past 10 years. Subjects might not feel that consuming fast foods is a fashionable behavior because fast foods have become part of their lifestyle in urban area. "Cheese is one of the reasons to consume fast foods" obtained a similar amount of responses in all three categories (28.9% in "reject", 36.1% in "neutral", and 34.9% in "accept"). Cheese was not a reason to consume fast foods for around one third of subjects, but was indeed a

reason for another one third of subjects. It is without a doubt that increased cheese consumption is due to the success of fast foods. However, cheese is probably not the main reason to consume fast foods.

"The advertising of fast foods emphasizes the presence of cheese" obtained the lowest agreement (Figure 4.7). 40.6% respondents disagreed or strongly disagreed with it. The image of stringiness of melted cheese usually appeared and was emphasized on commercial pizza advertisements. However, the advertisements only focused on pizza itself and people were not told that the stringy substance on pizza is cheese. Although most people had already seen and consumed cheese on pizza, they still had no idea what cheese was.

Comparing cheese acceptability of subjects with their elders

All subjects were asked to compare their cheese acceptability with their elders and 773 of them responded. 9.4% respondents thought their elders would never accept cheese. 37.4% and 16.0% thought their elders' cheese acceptability was much lower and somewhat lower than respondents themselves, respectively. 31.6% expressed that the acceptability of their eiders was the same as theirs. Finally, only 4.7% and 0.9% respondents thought their elders' cheese acceptability was somewhat higher and much higher than respondents themselves, respectively. Thus, it was obvious that very few respondents' elders accepted cheese more than

the respondents themselves. Focus group results that suggested a much lower acceptance of cheese by elders was reflected by survey questionnaire.

According to Li and Xiao (1999), the older Chinese population usually fell into the "conservative" type of consumers. These people did not embrace any alteration in their personal life or society. They accepted western foods with difficulties. Asian cultures are known to respect elders. As compared with Pacific Islanders, African Americans, Caucasians and Native Americans, Asian were most affected by their parents on food consumption (Bock and others 1998). Subjects in the previous focus group study (Chapter III) indicated that they never or seldom ate cheese at home because their parents did not purchase and consume cheese. Therefore, the low cheese acceptance of parents or elders might be a reason that cheese was consumed at home infrequently.

Opinions of possibility of combining cheese with Chinese foods and willingness to try new "Chinese foods" specially developed for cheese

After questioning all subjects about their opinions of possibilities of combining cheese with Chinese foods, 776 of them gave their responses. 85.6% respondents thought cheese could combine with only certain Chinese foods. Only 6.2% thought cheese never combine with Chinese foods. Therefore, most respondents expressed their opinions that cheese could only combine with certain Chinese foods.

This suggests some openings on the part of Taiwanese to try to incorporate cheese into their traditional cuisine.

Subjects from the previous focus group study (Chapter III) mentioned that cheese was not like any Chinese foods and was not compatible with Chinese seasonings and condiments. However, they agreed certain foods might combine with cheese if new Chinese food were specially developed for cheese. Subjects in this study also came to the same agreement. Producing trans-ethnic foods has formed a trend in Pacific Rim Asia. For example, rice burgers (meat or vegetable patty served on rice bun) gained acceptance in Japan (Nielson and others 1992). Cheese has been used in some newly invented Chinese cooking introduced through TV shows or recipe books in Taiwan. According to the subjects from previous focus groups, they agreed the new foods must be easy, simple and quick to make, be able to combine with rice and oriental seasonings and ingredients, not require special equipment, and taste delicious.

All subjects were asked, "if there were a new Chinese food specially developed for cheese, how likely would you be to try it?" 775 of them responded. 24.9% of these 775 subjects would be very likely to try these new "Chinese foods". 54.8% of them would be somewhat likely to try. 16.8% and only 3.5% respondents would be not likely and not at all likely to try. Thus, near 80% respondents showed their willingness to try the new "Chinese foods" specially developed for

cheese. In fact, embracing new ideas is one of the characteristics of the Chinese culture (Denton and Xia 1995). Taiwanese consumers regularly search for new food items and new tastes. They are willing to adopt all kinds of new food ideas (Olscheske 1990). Thus, invention of new modern Chinese foods might be a good approach to stimulate cheese consumption in the integrated China region.

## Subjects' opinions, preference, and expectations regarding sensory characteristics of cheese

### Overall liking of appearance, aroma, texture and flavor of cheese

Consuming cheese is not a tradition in Pacific Rim Asian countries and cheese initially obtained an image associated with bad odor and taste. Furthermore, it was considered poisonous (Griffin 1999). 768 and 769 of subjects responded to questions regarding their liking for the four major sensory characteristics of cheese, appearance, aroma, texture and flavor. The seven liking levels were reduced to three categories: "dislike", "neutral", and "like". Chi-square analysis indicated that a significant difference existed among the distributions of the three categories of all four sensory characteristics ($\chi^2$= 135.310; $p<0.001$; Figure 4.8). Most respondents reported that they liked cheese appearance, aroma, texture, and flavor in general. Less than 18% of responses fell into the "dislike" category and over 50% responses fell into the "liking" category in general. However, Yeh and others

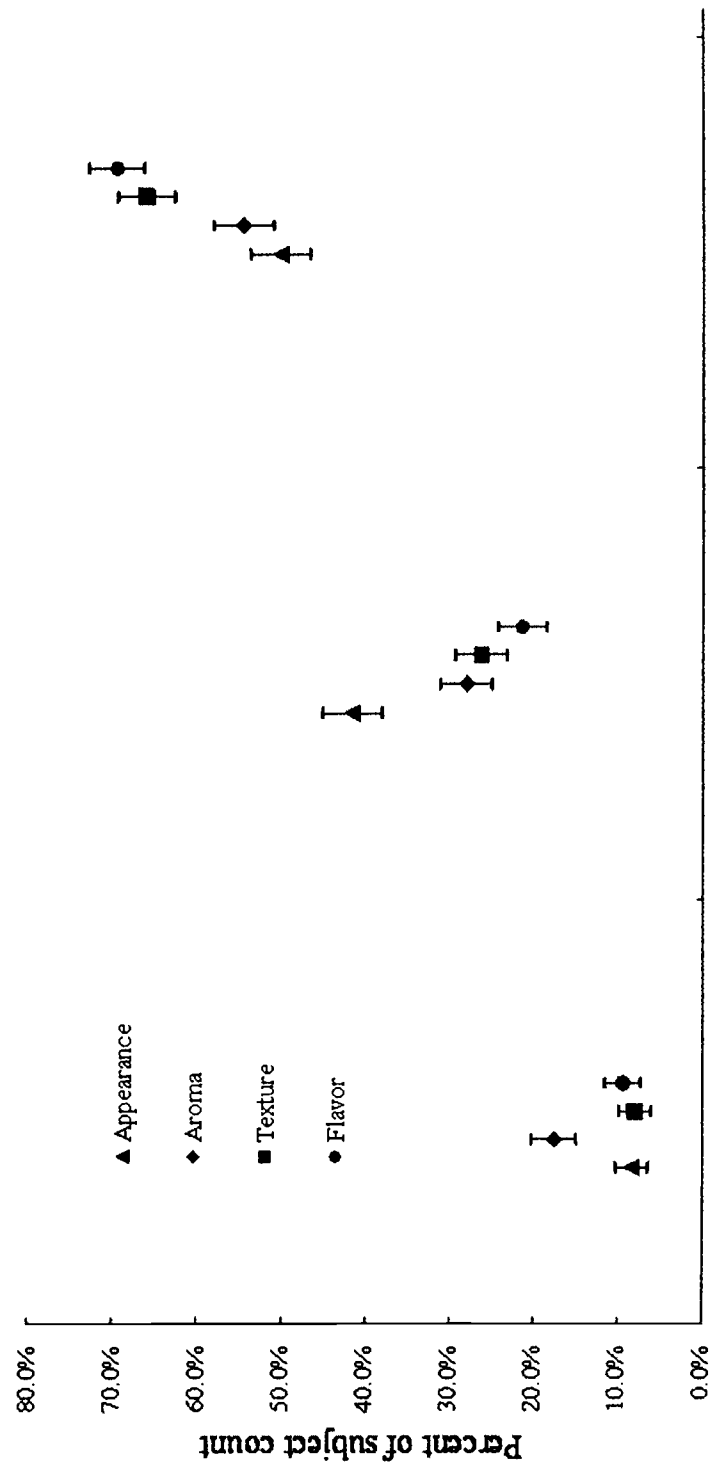


Figure 4.8. Comparison of overall cheese preference of subjects regarding sensory characteristics.

(1998) showed that subjects from Taiwan tended to use central categories and avoided dislike categories. Thus, subjects in this study might not truly like cheese but still gave positive opinions.

The relative liking of the four sensory characteristics was further compared. Aroma was least liked, followed by appearance that was neither liked nor disliked; texture and flavor gained the most liking by average subjects (Figure 4.8). 41.5% of respondents neither liked nor disliked appearance; however, fewer subjects neither liked nor disliked aroma, texture, and flavor. 17.6% respondents disliked cheese aroma, but only around 8% disliked the other three characteristics. 65.9% and 69.3% respondents liked cheese texture and flavor but fewer subjects liked appearance (50.1%) and texture (54.4%). Spearman's correlation analysis showed that all four characteristics were highly positively correlated to each other ($\rho \geq 0.50$; $p < 0.001$). Respondents who liked one of the four characteristics would also like the other three characteristics.

Overall ranking of importance of appearance, aroma, texture and flavor of cheese

752 subjects also ranked the importance of appearance, aroma, texture and flavor of cheese. "First" was the most important and "fourth" was the least important. Flavor was the most important characteristic (1.82), followed by texture (2.43) and aroma (2.48). Appearance was the least important characteristic (3.28)

Table 4.5. Subjects' overall ranking of importance of the sensory characteristics of cheese

| Sensory characteristics | Most important First | Second | Third | Least important Fourth | Mean rank |
|---|---|---|---|---|---|
| **Appearance** | 102 | 65 | 108 | 477 | 3.28 |
| **Aroma** | 140 | 199 | 328 | 85 | 2.48 |
| **Texture** | 123 | 298 | 217 | 114 | 2.43 |
| **Flavor** | 387 | 190 | 99 | 76 | 1.82 |

Total 752 respondents

Degree of freedom= 3

Chi square= 483.862; $p < 0.001$ from Friedman's test

1= most important and 4= least important

(Table 4.5). There was a significant difference between the mean ranks of four sensory characteristics ($\chi^2$=483.862 and $p<0.001$ from Friedman Test). The multiple comparisons of the four mean ranks were also performed. All pairs showed significant differences (2-tailed $p<0.001$ from sign test). This was consistent with the pervious focus group results. Those results agree with Schutz and others who found that flavor was more important than appearance, aroma and texture in influencing food purchasing and consumption (1986).

After flavor, texture was the second most important criterion. It is extremely influential to Pacific Rim Asians (Nielson and others 1992). Subjects in the previous focus group thought cheese texture directly drives their liking and acceptance. Aroma was the third and appearance was the least important. In the previous study appearance was the least influential sensory characteristic. These results were consistent with the results presented earlier regarding sensory factors that influence subjects' decision-making.

Expectations regarding the descriptors of cheese appearance, aroma, texture and flavor

All subjects were questioned about their expectations of cheese sensory characteristics; 754 to 759 subjects responded. These sensory descriptors, eight in appearance, five in aroma, eleven in texture, and nine in flavor, were generated

from the previous focus group study. The five agreement levels were reduced to three categories (reject, neutral, and accept). Chi-square analysis indicated that there were significant differences among the distributions of the three categories of descriptors of appearance ($\chi^2$=1200.211; p<0.001; Figure 4.9), aroma ($\chi^2$=516.476; p<0.001; Figure 4.10), texture ($\chi^2$=1897.616; p<0.001; Figure 4.11), and flavor ($\chi^2$=2706.372; p<0.001, Figure 4.12).

First, around 50% of respondents agreed or strongly agreed that melted cheese looked "stringy" and "glossy" and that cheese should have a yellow color. Oily and sticky looking was rejected by around half of the respondents. Among the three descriptors of cheese color, the presence of yellow tended to be agreed upon by more respondents (Figure 4.9). Then, 80.1% of subjects agreed or strongly agreed that creaminess is key cheese aroma descriptor (Figure 4.10). Third, the 4 terms the respondents (70% or more) found most descriptive of cheese texture were "smoothness", "softness", "melted in mouth", and "fineness". Also important descriptors including "chewiness", "springiness", "dense and viscous", and "stringiness (melted cheese)". "Melted in hands" was the descriptor obtaining the lowest degree of agreement. 45.6% respondents disagreed or strongly disagreed with it (Figure 4.11). Finally, regarding the 9 flavor descriptors, most respondents accepted the tastes of "cheese flavor", "buttery", and "milky" as descriptors of cheese; Over 69% of respondents agreed or strongly agreed. "Oily" and "bitter

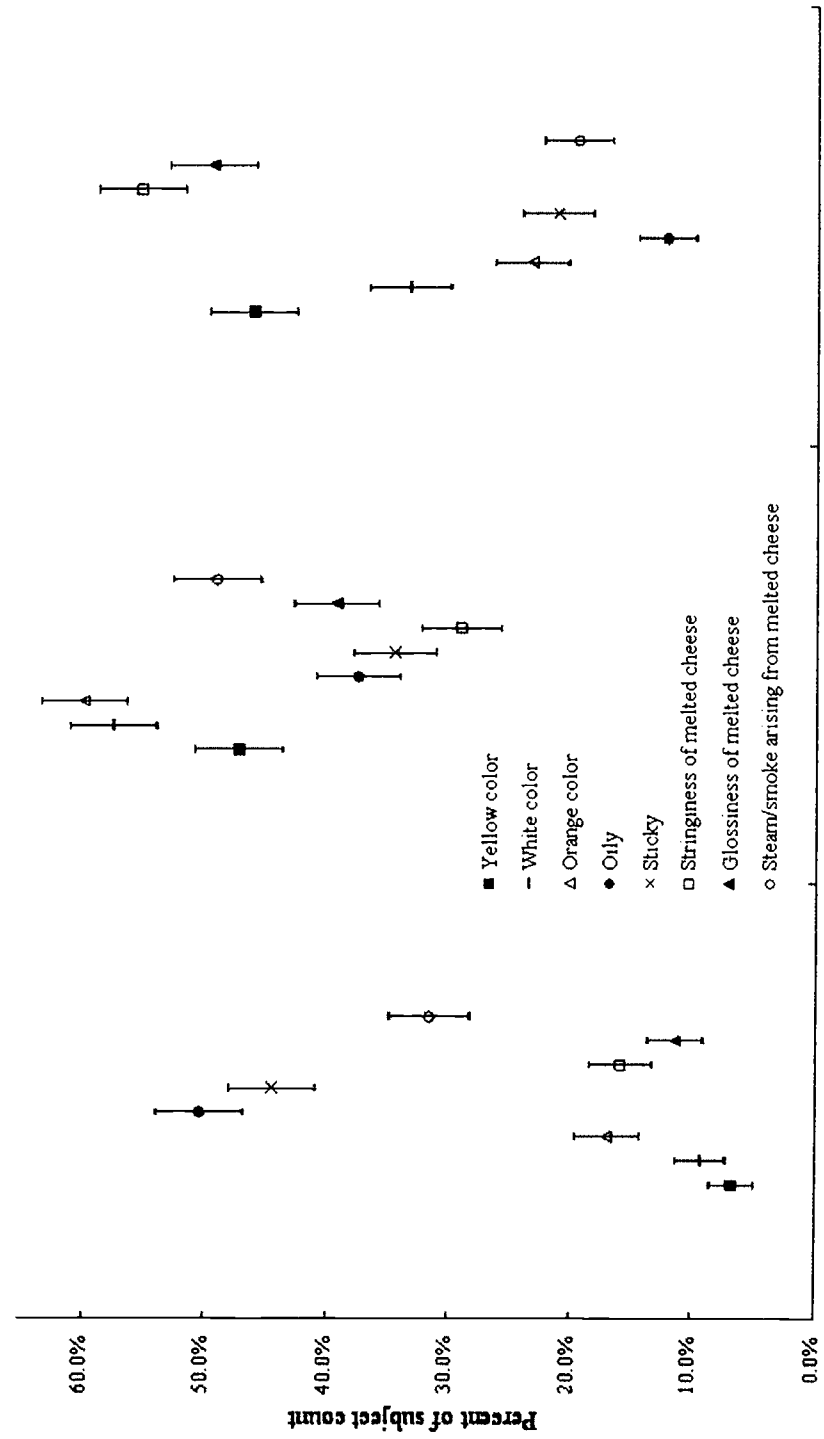


Figure 4.9. Comparison of subjects' agreement of terms regarding cheese appearance.

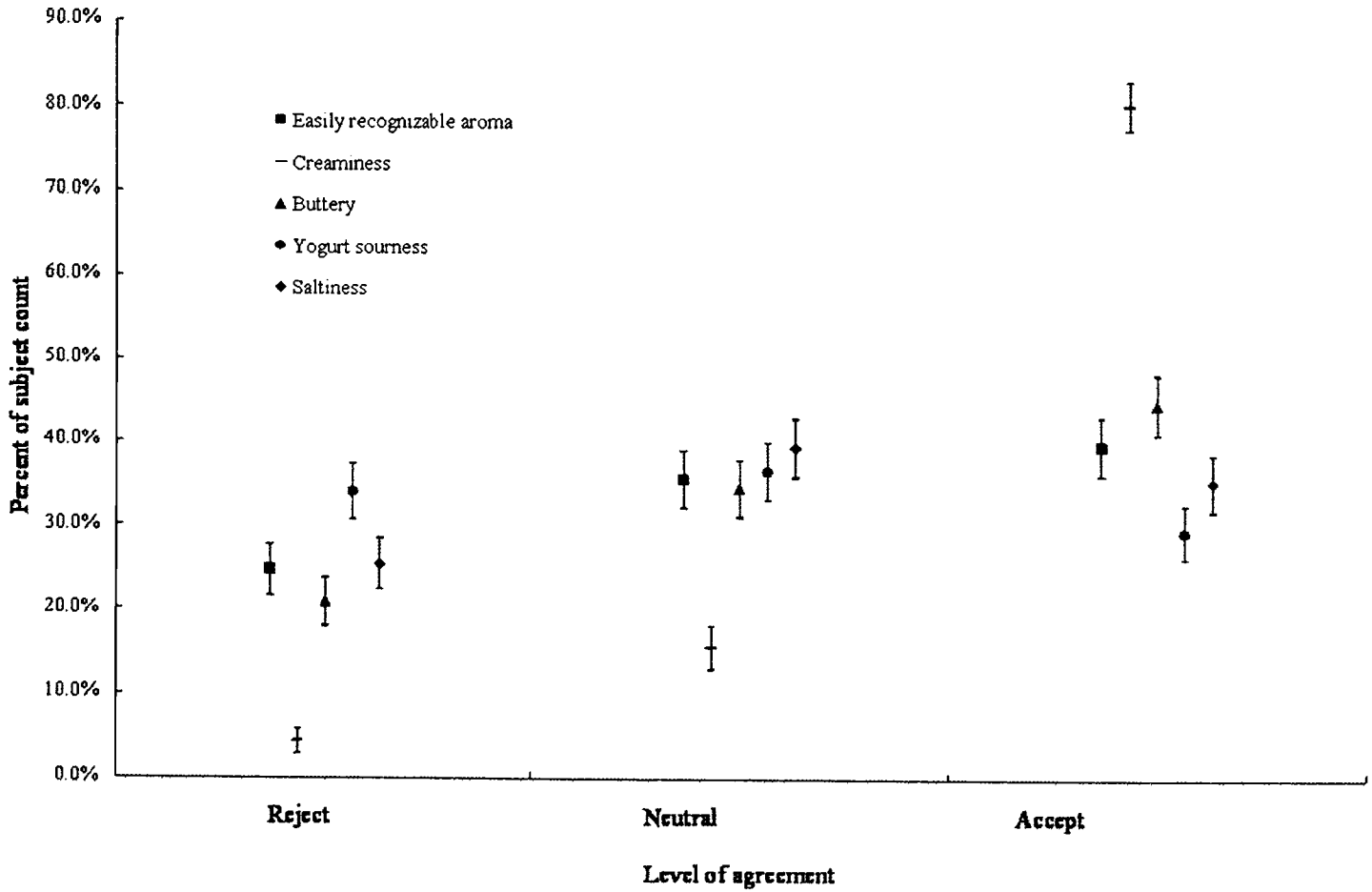


Figure 4.10. Comparison of subjects' agreement of descriptors regarding cheese aroma.

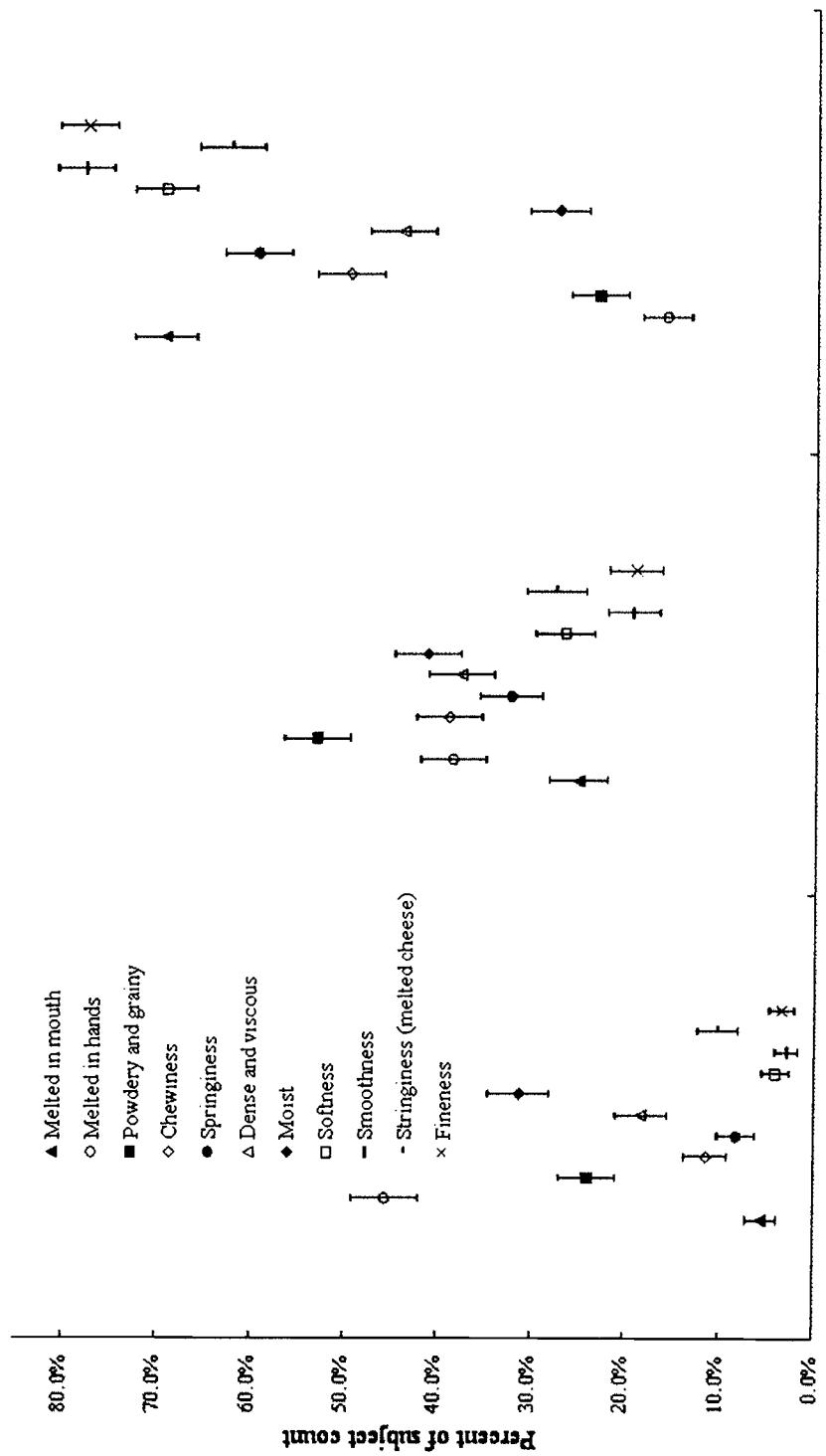


Figure 4.11. Comparison of subjects' agreement of descriptors regarding cheese texture.

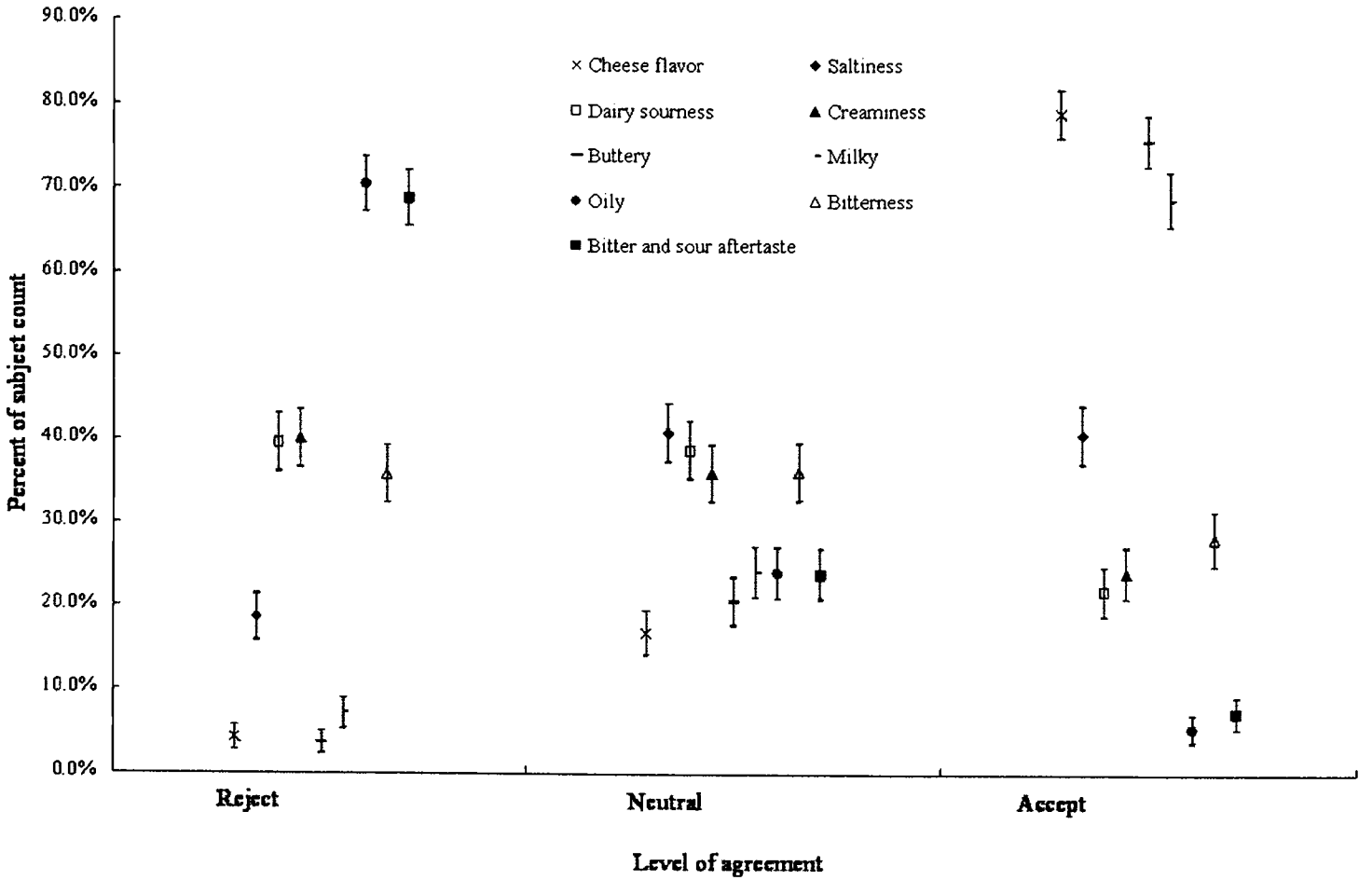


Figure 4.12. Comparison of subjects' agreement of terms regarding cheese flavor.

and sour aftertaste" obtained the lowest degree of agreement. Over 69% respondents disagreed or strongly disagreed (Figure 4.12.).

The results showed that subjects' sensory expectation on some descriptors were interesting. Subjects agreed that cheese should be yellow. However, color perception of cheese in South Korea was different. Koreans thought that the quality of yellow cheese was low (Stringer 2000). Although both Taiwan and South Korea are located in Pacific Rim Asia, there were variations regarding cheese perception and exporters should consider them seriously.

Stringiness of melted cheese was important to Taiwanese respondents. Subjects agreed that stringy-looking and stringy-texture in cheese were important characteristics. The previous focus group study (Chapter III) showed that subjects favored stringiness and they thought stringy appearance could appease their appetite. In Taiwan, most pizza advertisements emphasized the stringy looking of cheese when separating pizza slices. Thus, people favor stringiness, no matter what type of cheese they consume. A recent TV ad produced by Kraft Inc. in Taiwan also focused on the stringy image of sliced processed cheese placed in a cheese sandwich.

Cheese creaminess in aroma and flavor obtained different degrees of agreement. Creamy aroma was highly important to most subjects but creamy flavor was not.

"Creamy" in Chinese means a slightly sweet milky smell and taste which comes from hot dairy products. Subjects might have confused creamy and milky flavor, since over 65% of subjects agreed or strongly agreed there is a milky taste in cheese. Subjects' knowledge about creaminess might be quite different than for westerners. In the cross-cultural study of Australians' and Japanese' liking toward sweetness in ice cream, the meaning of creaminess in the two cultures was considered different (Prescott and others 1997). Thus, creaminess should be defined in different cultures.

"Oily" appearance and taste were rejected by over half of the subjects. A major complaint about U.S. food products in Japan was that they were too salty or oily (Nielson and others 1992). The previous focus groups also mentioned that U.S. cheese was oilier than New Zealand cheese. Nielson and others (1992) pointed out that the sweetness, saltiness, seasoning, oiliness, and fat or cholesterol levels of specific foods that would be exported to Pacific Rim Asia should be modified. In the case of exported cheese, mild varieties of cheese were considered more acceptable in Pacific Rim Asia (Olscheske 1990; Griffin 1999). The accepted level of each sensory term used to describe each type of cheese needs to be determined in order to help U.S. cheese manufacturers serve the true "Asian taste".

SUGGESTIONS TO U.S. CHEESE MANUFACTURERS

1. **Continue efforts to export mozzarella and sliced cheeses, but also take advantage of the potential market for cheese ingredients suitable for making au gratin foods, cheesecake, spaghetti, etc. for the wholesale restaurant business.**

2. **Be aware of the strong emphasis on breakfast food items, sandwich cheeses (sliced and spreadable cheeses with various flavors) and small sized packages with single servings for home use. I nvestigate the market potential of snack and dessert cheese items (i.e. bite-size with single portion of cheese and small animal- or toy-shaped cheeses).**

3. **Focus on packaging of cheese:** 1) unique and attractive design, 2) cheese slices or small cheese cubes individually wrapped, 3) vacuum and transparent package and 4) English and Chinese labeling.

4. **Address the health issues related to cheese.** Emphasizing calcium in cheese is important. Low-fat cheeses might be a good solution. Lactose intolerance is an issue now; however, it might not be a problem in the future if Asian adults start to drink milk.

5. **Develop long-term marketing plans and communication with foreign importers.** Be aware of the importance of building brand recognition and loyalty, and cooperating with local supermarkets or hypermarkets to provide sample tastings and give discounts. Use a spokesperson (i.e. famous TV and movie stars or singers) in cheese advertisement. Other innovative marketing strategies can work well as long as these strategies are based on native residents' culture and lifestyle.

6. **Be aware of consumers' attitude toward the relationship between cheese price and quality.** The product should be priced so that it is neither the most expensive nor the least expensive. Many Chinese people are willing to pay more in order to get better quality. At present, it is difficult for U.S. cheese to compete with New Zealand and Australian cheeses on price. U.S. cheese manufacturers may be successful exporting high quality and premium cheeses to this region.

7. **Develop new trans-ethnic foods containing cheese.** Chinese people are willing to accept new food ideas. Cheese products which provide a new acceptable flavor, such as garlic and seafood flavor, may be widely accepted by the urban Chinese.

8. **Be aware that a successful cheese exports strongly depend on developing "local-taste" cheeses.** Taiwanese considered aroma, flavor and texture to be the most important product characteristics affecting purchasing decisions. Based on the results from this study, "local-taste" for Taiwanese for cheese would be avoidance of oily appearance and flavor, sticky appearance, melt-in-hand, bitter flavor and bitter and sour aftertaste, and inclusion of stringy appearance and texture, creamy aroma, yellow color, glossy-looking, melt-in-mouth, soft, smooth, and fine texture, and milky and buttery flavor. Mild flavored cheeses with good melting properties may be well accepted.

9. **Sensory consumer panels need to be conducted locally to precisely target consumers' acceptance and preference in a particular cheese and create a profile of local taste.** However, the cost of conducting a sensory panel outside U.S. is huge. The previous focus groups showed that subjects who had resided in the U.S. within a limited of time did not change their dietary habits much. Thus, conducting a consumer panel using Chinese newly residing in the U.S. and whose dietary habits are not westernized is a less expensive option.

10. **Education of the consumer regarding cheese is required.** Exposing and educating Chinese to the taste of different cheeses is important. Cheese unfamiliarity still exists among the Chinese. Consumers are not willing to

purchase and consume cheese at home without knowing how it might augment their cuisine. Marketing high quality and premium products requires consumers with certain cheese knowledge. An educational strategy that teaches the Chinese first to consume mild cheeses and then to move to strong-flavored cheeses would be a good start.

## CONCLUSION

The objective of this study was to identify issues related to cheese among native Taiwanese urbanites. Although the subjects in this study were not randomly selected, the findings were such that some conclusions may be drawn.

The Taiwanese, once thought to dislike cheese of all kinds, have opened their homes and their lifestyles to a variety of cheeses and cheese products. The market potential for marketing cheese to Asian is growing and may be larger than once thought possible.

Results from the extensive survey in Taiwan were well reflected by the findings from the focus groups conducted in the U.S.. Most findings (around 84%) in the focus group study were consistent with those found in this survey study. Focus group findings also reasonably provided some explanations of results in this study. When an inconsistency was found, it was usually concerning greater usage and

better acceptance of cheese by Taiwanese than was expected based on focus group results. Therefore, focus group interviewing of Taiwanese students is a valid first step prior to actual surveying or product tasting in Taiwan.

The information gathered in this study can be used by U.S. cheese manufacturers increase exports to this potential market – the integrated Chinese marketplace. However, if focusing on the entire Pacific Rim Asia market, further and detailed information must be collected country by country.

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# V. THESIS SUMMARY

Pacific Rim Asia has become the most important cheese import market in the world (Etesse 1998; FAO 1999; Griffin 1999; Sørensen 1997). This thesis targeted purchasing and consumption behaviors, attitudes, opinions and expectations toward cheese among Taiwanese urbanites in order to help U.S cheese industries successfully export their products into the integrated Chinese marketplace. The focus group consisted of 25 international students from Taiwan who were interviewed, and the results were used to design questionnaires for the later consumer survey with 793 urbanites in Taiwan. Most (84%) of the focus group results (qualitative) were consistent with survey findings (quantitative). Thus, focus group interviewing was indeed a practical tool to investigate consumer-related research topics.

Since cheese is not a traditional food among Chinese, cheese was rarely consumed at home and was not familiar. Only easy, quick, and convenient food and cheese forms such as a cheese sandwich and sliced cheeses were popularly consumed at home. Cheese was consumed most frequently at breakfast. Subjects' restaurant consumption behaviors were more diverse. More food items containing cheese (i.e. fast foods and au gratin foods) and more occasions (breakfast, lunch and dinner) were involved. In addition, cheese was considered as an ingredient.

Some Chinese traditions truly reflected the subjects' attitudes toward cheese. First, cheese needed to be served melted as heated food is safer. Second, small packages of cheese were purchased frequently, which is more the shopping styles of Taiwanese. Third, Taiwanese are willing to try new Chinese foods specially developed for cheese.

All 16 product characteristics which related to sensory, visual and marketing characteristics were considered influential when making decisions regarding purchasing of cheese. Price, usage convenience, and health concerns were the most important. Cheese with a moderate price, individually wrapped slices, low in fat and cholesterol, and high in calcium would be preferred. Aroma, texture and flavor, were most important, while appearance was less important. Sensory descriptors such as stringy appearance and stringy texture, glossy appearance, yellow color, creamy aroma, smooth, fine and soft texture, melt-in-hand, and milky and buttery flavor were strongly expected in cheese. In contrast, oily and sticky looking, oily taste, and bitter and sour aftertaste needed to be avoided.

Suggestions based on the thesis results were made to U.S. cheese manufacturers. Developing a local taste of cheese is important, which could require further sensory studies need to be conducted. Establishing appropriate marketing strategies which consider culture, society and lifestyle is also critical. Moreover, consumer education is the root of increasing cheese consumption. This thesis has targeted

the Chinese people. To fulfill the goal to successfully export cheese to the whole Asian Pacific region, similar studies should be done with different Asian ethnic groups.

In conclusion, there is indeed a large potential market for cheese in Asia. Attitudes and behaviors toward cheese have changed, and the introductions of products which pay attention to sensory preference and are supported by innovative marketing and consumer education have good chance of succeeding.

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# APPENDICES

Appendix 3.1. Pilot focus group questions

**SESSION 1**

Describe the purpose of this focus group discussion
Please introduce yourself to everybody.

1. Describe your impression about cheese.
   When you see or hear the word "cheese", what comes to your mind?

2. Describe your past experiences with cheese.
   Please tell us when/where/how you experienced cheese.
   Please describe your bad/good experience and problems related to your past experience.
   ***Probe:***
   ***How did your family, your friends or someone (something) influence you to consume cheese?***
   ***What kind of food with cheese you consumed in the past?***

3. If you were told: "cheese is nutritious and healthy", what does that mean to you?
   In your opinion, is cheese nutritious and healthy and how would it influence your health?
   ***Probe:***
   ***If you know cheese has calcium and it can prevent you from osteoporoses, will you consume more cheese and why?***
   ***Do you think lactose intolerance is a problem influencing Asians to consume more cheese?***

4. Where do you buy cheese in your country? Please tell us the reason you go to these places.
   Can you recall where you buy cheese in your country? And how often did you purchase cheese? ***(Also ask a little bit frequency purchase)***

5. Show sample poster

On these transparencies, you can see pictures of different kinds of cheeses. Can you point out those which you recognize or have seen before? Also, can you point out those which you have bought before and tell us why you bought them. Which of these do you mostly consume?

If you cannot recognize any of those, can you describe what kind of cheese you have consumed or purchased before?

***Probe:***

***What form of cheese (sliced/chunk/grated/spreadable/snack) you mostly purchase and why? Why you don't or seldom purchase others?***

6. Assume you go to a supermarket to shop your food. You decide to buy some cheeses today and you walk to the cheese display shelves. You see varieties of cheese there. What kind of cheese will you buy? How do you choose cheese? What factors do influence you to make the final decision? Which factor is most important to you and why?

***Probe:***

***When buying cheeses, is usage convenience an important factor to you to make a decision? Would you please tell the reason? What does "convenience" mean to you?***

***Is price an important factor to you to make a decision? What price do you think it's reasonable for you to purchase?***

***Is package size an important factor to you to make a decision? What is the reasonable package size for you?***

***Do you concern about where cheese is made in? What "Made in where" cheese do you prefer to purchase and why?***

***In your opinion, what is cheese good/bad quality meant to you? Do you consider cheese quality when purchasing cheese? What factors do affect cheese quality?***

7. Describe the ways you consume cheese. (with transparencies)

How do you eat cheese at home?

***Probe:***

***How do you consume cheddar/jack/mozzarella/parmesan/American cheese?***

In your mind, can you list the kinds of foods/dishes you make with cheese or what kind of food do you eat with cheese?

***Probe:***

***Do you use different cheeses to make different dishes? What kind of dish and cheese do you usually combine together? And why do you use this cheese to make this dish?***

Do you eat cheese without other foods?

***Probe:***

***What kind of cheese do you eat alone? When do you eat cheese alone? (like snack) I f you eat cheese alone as a snack, what form of cheese do you buy and why?***

***What kind of food do you make with melted /unmelted cheese at home? When do you eat cheese at home? Can you make a list of occasions that you eat cheese from most often to seldom? Can you tell us the reason you consume cheese at these times?***

8. If you know lots of ways to prepare dishes with cheese, first, are you willing to consume more cheese? Then, will you increase the occasions to eat cheese? Do you think it is possible to combine cheese with your daily dairy patterns (your own cuisine)?

9. Maybe you heard "Asians don't like cheese". What is your opinion about this? If you think that is a truth, why Asians don't like cheese?

10. Our discussion today was to help understand cheese consumption concepts and behaviors. Have we missed anything?

11. What to you has been the most important topic that we've discussed in the past two hours?

**SESSION 2**

***Initial phase***

1. In your opinion, what are the words you use to describe cheese?
2. Which of the words are positive (accepted) descriptors for you?
3. Which of the words are negative (unaccepted) descriptors for you?

***Sample evaluation***

Appearance and Aroma:

[Please look at and smell these samples. ]

4. How would you describe the appearance and aroma?
   ***(Probe: color, creamy, oily, greasy, glossy, fatty, polished, plastic, gel, sticky)***
   ***(Probe: milky, buttery, fatty, glue, stink, cooked )***

Texture and Flavor

5. How would you describe the flavor of these cheeses?
   ***(Probe: mild, salty, sour, bitter, creamy, yogurt, oily, milky, buttery, plastic, aftertaste, cooked)***
6. How would you describe the texture of these cheeses?
   ***(Probe: soft/hard, chewy, rubber, creamy, adhesive, crumbly, brittle, greasy, melted in mouth, crunchy, smooth, plastic, sticky, gummy, elastic)***

***Concluding phase***

7. Overall, what are differences between melted and unmelted cheese? Do you like melted or unmelted cheese and why?
   ***( Probe: heat effect, sensory terms)***

8. Overall, what are differences between cheese with bread and rice? Do you like cheese with bread or with rice and why?

9. What are the three most important and the three least important sensory characteristics for you and why did you choose these particular terms?
   ***( Probe: what sensory characteristics do you think that strongly influence your decision-making when purchasing cheese?)***

10. What appearance, aroma, texture and flavor characteristics do you think cheese should or should not have?

11. Regarding all sensory characteristics that are most important and other factors we discussed last time, please describe your "dream cheese", the cheese you like the most and definitely purchase.

12. Have we missed anything?

13. What to you has been the most important topic that we've discussed in the past two hours?

Appendix 3.2. Focus group bilingual questions.

**SESSION 1**

1. When you see or hear the word "cheese", what comes to your mind?

   當您看到或是聽到 cheese 這個字的時候，您會想到甚麼？

2. How did your family, friends or others influence you to begin consuming cheese? What kinds of cheese and foods did they introduce to you?
   您的家庭、朋友或是其他人事物如何影響您開始吃 cheese? 他們把哪一種 cheese 介紹給您?

3. What do you feel about pizzas and hamburgers?
   您對漢堡跟披薩的感覺是甚麼?
   *(Ask about sensory characteristics regarding cheese)*
   *(Explore why they like pizza and hamburger)*

4. Please tell us the ways in which the particular cheeses are used to make those dishes.
   請告訴大家您知道哪種 cheese 會用在哪種餐點裡。

5. In your opinion, how does or does not cheese influence your health?
   您覺得 cheese 會不會影響您的健康?
   *(probe: calcium and vit.D)*

[On your handout, you can see pictures that have different types, forms and packages of cheese. Please look at them regardless of brand. (If you have not seen or consumed any of them or you are not sure which one you have seen or consumed, please describe the ones you have seen or consumed.)]
在您面前的講義上，您會看到不同種類，形狀以及包裝的 cheese。除了 cheese 的品牌之外，請您注意看這些圖片。(假如您沒有或不確定見過或吃過圖上任何一種形式的 cheese，請您描述您見過或吃過的 cheese)

6. What types, forms and sizes of cheese have you seen before?
   哪些種類、形狀和大小的 cheese 您以前曾經見過？
   Where did you see them? In Taiwan or in the U.S or both?
   您在哪邊看過？台灣？美國？或是兩地都有？
   What types and forms cheese have you consumed before?
   哪些種類和形狀的 cheese 您以前曾經吃過？

Where did you consume them? In Taiwan or in the U.S or both?
您在哪邊吃過？台灣？美國？或是兩地都有？

7. Where did you purchase cheese in Taiwan?
   您在台灣時，您會在那裡購買 cheese?
   *(Probe: possibilities of appearance in the traditional market.)*
   And how often did you purchase cheese in Taiwan?
   您在台灣時，您多久會購買一次 cheese?
   *(Probe: How many of you did grocery shopping by yourselves in Taiwan? If not, who are responsible for grocery shopping for you?)*
   What types, forms and sizes of cheese have you purchased mostly? What reasons influence you to purchase?
   哪些種類、形狀和大小的 cheese 您最常購買？原因是甚麼？
   *(probe: how many of you pay attention to the brands, forms, types and price of cheese?)*

8. Assume you go to a supermarket to shop for your food. You decide to bring some cheese home today and you walk to the cheese display shelves. You see varieties of cheese there. What factors influence you to make a final decision about how to choose your cheese today? Which factor is the most important to you? Please tell us about your opinion.
   *Is.....an important factor to you? What is the reasonable.....for you?*
   請您想像一下，您今天到一家超市去買菜，您決定要買一些 cheese 帶回家吃，您走到陳列各式各樣 cheese 的冷藏櫃前準備要拿 cheese，哪些因素會影響您購買 cheese 的決定？哪一項因素對您來說最重要？請告訴大家您的看法。
   .....對您來說很重要嗎? 怎樣的.....對您來說是合理的?
   (Usage convenience, type, form, brand, price, package size, taste and where cheese is made in)

9. In your opinion, what does good quality cheese mean to you?
   您認爲品質良好的 cheese 要具備甚麼條件？
   *(probe: if say taste, what taste characteristics represent good quality?)*

10. Please describe the ways, places, and occasions you consume cheese. How did you learn about those ways to consume cheese?
    請您描述您吃 cheese 的方法、時間跟地點。您怎麼知道這些方法的？
    *(probe: How many of you consume cheese outside more frequently than at home? Please tell the reason.)*
    *(probe: how many of you consume or prepare melted cheese more frequently than unmelted cheese? Please tell the reason. If not, please tell the reason also.)*
    *(probe: What types and forms of cheese have you consumed alone? When do you consume cheese on its own?)*

11. (Has your purchase and consumption of cheese changed after residing in the U.S.? How has your cheese purchasing and consumption behavior changed?) – **Not ask newcomers**
自從您到美國來住了這一段時間之後，您購買以及吃 cheese 的習慣受到改變嗎？請問是如何的改變呢?
*(probe: family or couple influence – assume couples keep their original dietary patterns the same as in Taiwan; people who cook together might also keep their own dietary patterns)*

12. Do you think it is possible to combine cheese with your daily dairy intake or your own cuisine? Please tell us your opinion.
您覺得 cheese 有可能跟您平常的飲食或是中國菜合併在一起吃嗎？請告訴大家您的想法。

13. What conditions make you purchase and consume more cheese?
請問在怎樣的情形之下您才會願意購買和吃多一點的 cheese？
*(probe: What conditions make you increase exposure of cheese?)*
*(probe: If you know lots of ways to prepare dish with cheese, are you willing to consume more cheese and why?)*
*(probe: If you were told, "cheese is nutritious and healthy", do you consume more cheese and why?)*

14. Maybe you heard "Young Asians don't like cheese, but they like pizza and hamburgers." Do you think this is true? What is your opinion about this?
或許您曾聽過「亞洲的年輕人不喜歡吃 cheese，但是喜歡吃披薩跟漢堡」的說法。您覺得這是真的嗎？請問您對於這句話的看法是甚麼？

15. Our discussion today was to help understand your cheese consumption concepts and behaviors. Have we missed anything?
我們今天的討論主要是爲了了解您們對於購買以及食用 cheese 的行爲以及看法。請問我們遺漏了甚麼您覺得很重要但是我們沒有討論到的地方？

16. What to you has been the most important topic that we've discussed in the past two hours?
在過去我們討論的兩小時之內，對您來說哪一個是最重要的主題？

**SESSION 2**

**Initial phase**

1. In your opinion, what are the words you use to describe cheese?
   您會用哪些詞語來描述 cheese？
2. Which of the words are positive (accepted) descriptors for you?
   那些詞語對您來說是描述 cheese 良好可以接受的一面？
3. Which of the words are negative (unaccepted) descriptors for you?
   哪些詞語對您來說是描述 cheese 差強人意不可接受的一面？

**Sample evaluation**

Appearance and Aroma:

[Please look at and smell these samples. ]

「請您仔細觀看還有聞聞這些 cheese 樣品。」

4. How would you describe the appearance and aroma?
   請問您如何描述這些 cheese 樣品的外觀跟氣味？
   *(probe: color, creamy, oily, greasy, glossy, fatty, polished, plastic, gel, sticky)*
   *(probe: milky, buttery, fatty, glue, stink, cooked )*

Texture and Flavor

[Please taste these samples. Between samples, you can eat apple slices and drink water.]

「請您品嚐這些 cheese 樣品，在品嚐不同的 cheese 樣品時，請您吃蘋果跟喝水來清除前一種樣品留下的味覺。」

5. How would you describe the flavor of these cheeses?
   請問您如何描述這些 cheese 樣品的口味。
   *(probe: mild, salty, sour, bitter, creamy, yogurt, oily, milky, buttery, plastic, aftertaste, cooked)*
6. How would you describe the texture of these cheeses?
   請問您如何描述這些 cheese 樣品的質地口感。
   *(probe: soft/hard, chewy, rubber, creamy, adhesive, crumbly, brittle, greasy, melted in mouth, crunchy, smooth, plastic, sticky, gummy, elastic)*

**Concluding phase**

7. Overall, what are differences between melted and unmelted cheese? Do you like melted or unmelted cheese and why?
整體上來說，您覺得融化跟沒有融化的 cheese 差別在哪裡？您比較喜歡融化的還是沒有融化的 cheese？爲甚麼？
*(probe: heat effect, sensory terms)*

8. Overall, what are differences between cheese with bread and rice? Do you like cheese with bread or with rice and why?
整體上來說，您覺得 cheese 融化在土司上跟在飯上差別在哪裡？您比較喜歡 cheese 融化在土司上還是融化的在飯上？爲甚麼？

9. What are the three most important and the three least important sensory characteristics for you and why did you choose these particular terms?
在今天用來描述 cheese 的詞語中，哪三個詞語對您來說是最重要的？哪三個是最不重要的？爲甚麼您選擇這些詞語？
*(probe: what sensory characteristics do you think that strongly influence your decision-making when purchasing cheese?)*

10. What appearance, aroma, texture and flavor characteristics do you think cheese should or should not have?
您認爲 cheese 應該或不應該具備哪些外觀、氣味、質地口感以及口味？

11. Regarding all sensory characteristics that are most important and other factors we discussed last time, please describe your "dream cheese", the cheese you like the most and definitely purchase.
請您回顧上次我們所討論過的結果，再加上今天我們討論描述 cheese 的詞語，請您總結您最喜歡並且一定會購買的 cheese 需要具備的條件。

12. Have we missed anything?
請問我們遺漏了甚麼您覺得很重要但是我們沒有討論到的地方？

13. What to you has been the most important topic that we've discussed in the past two hours?
在過去我們討論的兩小時之內，對您來說哪一個是最重要的主題？

Appendix 3.3. Focus group cheese picture handout.


**Cheddar cheese**


**Mozzarella cheese (pizza上面一絲絲的cheese)**


**Processed cheese**


**Colby Jack cheese**


**Parmesan**


**Cream cheese (可塗抹)**


**Monterey Jack cheese**

Appendix 3.4. Focus group bilingual registration form.

Background Information（基本資料）

1. Your Name（您的名字）_____

*First* *Last*

2. Age（年齡）
   ( ) Below 20（20 歲以下）
   ( ) 21 - 30（21 到 30 歲）
   ( ) 31 - 40（31 到 40 歲）
   ( ) Over 41（41 歲以上）

3. Gender（性別）
   ( ) Female（女）
   ( ) Male（男）

4. Living Status in the U.S.（住在美國的狀況）
   ( ) **Live alone** but mostly share daily cooking (or eating) with someone
   （一個人住但是幾乎天天跟別人一起煮飯吃飯）
   ( ) **Live alone** and always cook (or eat) by yourself
   （一個人住而且總是自己煮飯）
   ( ) **Live alone** and always eat outside
   （一個人住但是幾乎天天吃外面）
   ( ) ***L ive with someone*** *(relatives, roommates...) and mostly daily cooking (or eating) with them（跟別人一起住而且一起煮飯吃）*
   ( ) **Live with someone** but always cook (or eat) by yourself
   （跟別人一起住但是往往自己煮自己吃的）
   ( ) **Live with someone** but always eat outside
   （跟別人一起住但是幾乎天天吃外面）

5. Years residing in the U.S.（來美國的時間）
   ( ) Newcomer（剛來）
   ( ) Less than a year（不到 1 年）
   ( ) 1 - 2 years（1 年到 2 年）
   ( ) 2 - 3 years（2 年到 3 年）
   ( ) 3 - 4 years（3 年到 4 年）
   ( ) Over 4 years（超過 4 年）

6. Which of the following categories describe you? Check all that apply:
   ( ) ELI student（語言學校學生）
   ( ) Undergraduate student（大學部學生）
   ( ) Graduate student (self-supported student)（自己付學費的研究生）
   ( ) Graduate student (RA, TA, or Scholarship sponsored)
   （有獎學金或是當助理助教的研究生）
   ( ) Other. Please describe _____（其他，請註明）

7. Grocery shopping. Did you shop for your own food in Taiwan?（在台灣幾乎都是您自己買菜嗎？）
   ( ) Yes
   ( ) No

8. Grocery shopping. Do you shop for your own foods in the U.S.?（在美國幾乎都是您自己買菜嗎？）
   ( ) Yes
   ( ) No

9. How often did you eat Chinese food in Taiwan?（在台灣您多久吃一次中國菜？）
   ( ) More than once a day（一天超過一次）
   ( ) Once a day（一天一次）
   ( ) Once per two days（兩天一次）

10. How often do you eat Chinese food in the U.S.?（在美國您多久吃一次中國菜？）
   ( ) More than once a day（一天超過一次）
   ( ) Once a day（一天一次）
   ( ) Once per two days（兩天一次）
   ( ) Once per three days（三天一次）
   ( ) Once a week（一週一次）
   ( ) Less than once a week（少於一週一次）

11. How often do you cook at home in the U.S.?（在美國您多久煮一餐飯）
   ( ) Almost every meal
   （幾乎每頓都自己煮）
   ( ) Once a day; please specify the meal(s) you cook mostly _____
   （一天煮一次，請寫出您最常煮的那一餐）
   ( ) Once per two days; please specify the meal(s) you cook mostly _____
   （兩天煮一次，請寫出您最常煮的那一餐）
   ( ) Once per three days; please specify the meal(s) you cook mostly _____
   （三天煮一次，請寫出您最常煮的那一餐）
   ( ) Once a week; please specify the meal(s) you cook mostly _____

（一週煮一次，請寫出您最常煮的那一餐）

( ) Less than once a week; please specify the meal(s) you cook mostly _____
（少於一週煮一次，請寫出您最常煮的那一餐）

12. How often do you consume cheese?（您多久吃一次 cheese？）

( ) Daily（每天）
( ) Between daily and weekly（介於每天跟每週之間）
( ) Weekly（每週）
( ) Once per two weeks（兩週一次）
( ) Once a month（一個月一次）
( ) Once per three months（三個月一次）
( ) Once per six moths（半年一次）
( ) Once per year（一年一次）
( ) More than a year（一年以上才吃一次）

13. What types of cheese have you consumed? Check all that apply:（您吃過甚麼種類的 cheese？請勾選您全部吃過的 cheese 種類）

( ) American
( ) Cheddar (medium)
( ) Cheddar (sharp)
( ) Colby Jack
( ) Monterey Jack
( ) Flavored Jack (Peppered, garlic, etc..)（添加其他口味 Jack cheese）
( ) Mozzarella
( ) Parmesan
( ) Cream cheese (Original and flavored, etc..)
( ) Others. Please describe _____
( ) I don't know what types of cheese I have consumed.（我不知道我吃過哪一種的 cheese）

Appendix 4.1. Survey questionnaire in English.

**ID#** _____

**Hi, I am I-Min Tsai from the sensory lab at Oregon State University, U.S.A.. We're conducting a cross-cultural survey on cheese consumption in Taiwan and I would like to ask you some questions. I am very appreciated your help. Thank you very much!**

**What is cheese: Cheese is the dairy product made into sliced, chunk, shredded, spreadable and grated forms. Its color is usually orange (or yellow) and white. It is usually sold and put with milk, yogurt and pudding in the refrigerated section in supermarkets.**

**1. Did you (or your family/roommate) purchase cheese (in supermarkets or other stores) within the past year and then consume it (cheese only or homemade food containing cheese) at home? (Circle one number)**

1 NO (Please go to Q2)
2 YES, REGULARLY PURCHASE AND CONSUME IT (Please go to Q1a)
3 YES, BUT NOT REGULARLY PURCHASE AND CONSUME IT (Please go to Q1a)

**1a How often do you consume cheese or homemade food containing cheese at home in general?** ***(Circle the number of your response)***

1 EVERY DAY
2 ONCE EVERY 3 DAYS
3 ONCE A WEEK
4 ONCE EVERY 2 WEEKS
5 ONCE A MONTH
6 ONCE EVERY 3 MONTHS
7 ONCE EVERY 6 MONTHS
8 ONCE A YEAR

**1b** **Please indicate how often you consume cheese or homemade food containing cheese during each of the following meals at home (including the food prepared at home and taken out).** ***(Circle one number for each meal)***

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| a. Breakfast.. | 1 | 2 | 3 | 4 |
| b. Lunch..... | 1 | 2 | 3 | 4 |
| c. Dinner..... | 1 | 2 | 3 | 4 |
| d. Dessert*... | 1 | 2 | 3 | 4 |
| e. Snack..... | 1 | 2 | 3 | 4 |

*Dessert: for stopping hunger between meals, including night snack

**1c** **Please indicate how often you consume homemade food with cheese.** ***(Circle one number for each homemade food)***

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| a. Cheese only..... | 1 | 2 | 3 | 4 |
| b. Cheese sandwich | 1 | 2 | 3 | 4 |
| c. Au gratin foods..... | 1 | 2 | 3 | 4 |
| d. Pizza..... | 1 | 2 | 3 | 4 |
| e. Hamburger..... | 1 | 2 | 3 | 4 |
| f. Cheesecake..... | 1 | 2 | 3 | 4 |
| g. Bagel..... | 1 | 2 | 3 | 4 |
| h. Baguette..... | 1 | 2 | 3 | 4 |
| i. Spaghetti..... | 1 | 2 | 3 | 4 |
| j. Salad..... | 1 | 2 | 3 | 4 |
| k. Cheese with wine | 1 | 2 | 3 | 4 |

**1d** **What type of cheese do you consume at home <u>most often</u>?** ***(Circle one number)***

1 PROCESSED CHEESE
2 AMERICAN CHEESE
3 CHEDDAR CHEESE
4 MONTEREY JACK CHEESE
5 COLBY CHEESE
6 MOZZARELLA
7 PARMESAN
8 CREAM CHEESE
9 SWISS CHEESE
10 I DON'T KNOW WHAT TYPES AND NAMES OF CHEESE I CONSUME.

**1e** **Please indicate how often you consume each of the following form of cheese at home *(Circle one number for each form)***

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| a. Sliced cheese..... | 1 | 2 | 3 | 4 |
| b. Shredded cheese | 1 | 2 | 3 | 4 |
| c. Grated cheese... | 1 | 2 | 3 | 4 |
| d. Cheese spread... | 1 | 2 | 3 | 4 |
| e. Chunk cheese... | 1 | 2 | 3 | 4 |
| f. Cheese bar..... | 1 | 2 | 3 | 4 |
| g. Candy-like cheese | 1 | 2 | 3 | 4 |

**1f** **What package size of cheese do you consume most often at home? *(Circle one number)***

1 SMALL SIZE (UNDER 500G OR 12 SLICES)
2 MEDIUM SIZE (BETWEEN 500G AND 1 KG; 16 OR 24 SLICES)
3 LARGE SIZE (OVER 1 KG; OVER 24 SLICES)

**2. Please rate how influential each of the following factor may be in making decision to purchase cheese (in supermarkets or other grocery stores), using a scale of 1 to 7, where 1 is "least influential" and 7 is "most influential". *(Circle one number for each factor)***

| | NOT AT ALL INFLUENTIAL | | | | | | VERY INFLUENTIAL |
|---|---|---|---|---|---|---|---|
| a. Appearance..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Aroma..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Texture..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Flavor..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. Form..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| f. Cheese color..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| g. Package condition*..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| h. Package design and printing..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| i. Package size..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| j. Health concern..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| k. Usage convenience..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| l. Brand..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| m. Recommendation..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| n. Advertising..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| o. Promotion..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| p. Price..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

*Examples of package condition: vacuum package and sliced cheese wrapped with plastic film

**3. Did you consume cheese (or food containing cheese) at restaurants in the past year? (Including the foods purchased at restaurants and then consumed at home or elsewhere)** ***(Circle one number)***

1 NO (Please go to Q4)
2 YES (Please go to Q3a)

→ **3a How often do you consume cheese or food containing cheese at restaurants in general? (Including the foods purchased at restaurants and then consumed at home or elsewhere)** ***(Circle the number of your response)***

1 EVERY DAY
2 ONCE EVERY 3 DAYS
3 ONCE A WEEK
4 ONCE EVERY 2 WEEKS
5 ONCE A MONTH
6 ONCE EVERY 3 MONTHS
7 ONCE EVERY 6 MONTHS
8 ONCE A YEAR

**3b Please indicate how often you consume cheese or food containing cheese during each of the following meals at restaurants (including the foods purchased at restaurants and then consumed at home or elsewhere).** ***(Circle one number for each meal)***

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| a. Breakfast.. | 1 | 2 | 3 | 4 |
| b. Lunch..... | 1 | 2 | 3 | 4 |
| c. Dinner..... | 1 | 2 | 3 | 4 |
| d. Dessert*... | 1 | 2 | 3 | 4 |
| e. Snack..... | 1 | 2 | 3 | 4 |

*Dessert: for stopping hunger between meals, including night snack

**3c Please indicate how often you consume food with cheese at restaurants.** ***(Circle one number for each food)***

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| a. Cheese only..... | 1 | 2 | 3 | 4 |
| b. Cheese sandwich | 1 | 2 | 3 | 4 |
| c. Au gratin foods..... | 1 | 2 | 3 | 4 |
| d. Pizza..... | 1 | 2 | 3 | 4 |
| e. Hamburger..... | 1 | 2 | 3 | 4 |
| f. Cheesecake..... | 1 | 2 | 3 | 4 |
| g. Bagel..... | 1 | 2 | 3 | 4 |

| | | | | |
|---|---|---|---|---|
| h. Baguette..... | 1 | 2 | 3 | 4 |
| i. Spaghetti..... | 1 | 2 | 3 | 4 |
| j. Salad..... | 1 | 2 | 3 | 4 |
| k. Cheese with wine | 1 | 2 | 3 | 4 |

**4. Comparing your home consumption with restaurant, where do you consume cheese or food containing cheese most frequently?** ***(Circle one number)***

1 RESTAURANT ONLY
2 RESTAURANT MORE FREQUENTLY THAN HOME
3 RESTAURANT AS FREQUENTLY AS HOME
4 RESTAURANT LESS FREQUNETLY THAN HOME
5 HOME ONLY

**5. What form of cheese do you consume most frequently?** ***(Circle one number)***

1 MELTED CHEESE ONLY
2 MELTED CHEESE MORE FREQUENTLY THAN UNMELTED CHEESE
3 MELTED CHEESE AS FREQUENTLY AS UNMELTED CHEESE
4 MELTED CHEESE LESS FREQUENTLY THAN UNMELTED CHEESE
5 UNMELTED CHEESE ONLY

**6. Do you consume cheese more often with food or by itself?** ***(Circle one number)***

1 WITH FOOD ONLY
2 WITH FOOD MORE OFTEN THAN BY ITSELF
3 WITH FOOD AS OFTEN AS BY ITSELF
4 WITH FOOD LESS OFTEN THAN BY ITSELF
5 BY ITSELF ONLY

**7. How does the cheese acceptability of your parents and elders compare to yours?** ***(Circle one number)***

1 THEY NEVER ACCEPT CHEESE
2 THEIR ACCEPTABILITY IS MUCH LOWER THAN MINE
3 THEIR ACCEPTABILITY IS SOMEWHAT LOWER THAN MINE
4 THEIR ACCEPTABILITY IS THE SAME AS MINE
5 THEIR ACCEPTABILITY IS SOMEWHAT HIGHER THAN MINE
6 THEIR ACCEPTABILITY IS MUCH HIGHER THAN MINE

**8. Please indicate whether you degree or disagree with each the following statements regarding fast foods. *(Circle one number for each statement)***

| | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Cheese is one of the reasons to consume fast foods..... | 1 | 2 | 3 | 4 | 5 |
| b. Pizza is delicious..... | 1 | 2 | 3 | 4 | 5 |
| c. A cheeseburger is delicious..... | 1 | 2 | 3 | 4 | 5 |
| d. Fast food is convenient..... | 1 | 2 | 3 | 4 | 5 |
| e. Eating fast foods is fashionable..... | 1 | 2 | 3 | 4 | 5 |
| f. Young adults, teenagers and children go to fast food restaurants often..... | 1 | 2 | 3 | 4 | 5 |
| g. Young adults, teenager and children are attracted by toys inside or with the combo package..... | 1 | 2 | 3 | 4 | 5 |
| h. Fast food restaurants welcome students to discuss assignments..... | 1 | 2 | 3 | 4 | 5 |
| i. Fast food restaurants are good for having fun with friends for young adults and teenagers..... | 1 | 2 | 3 | 4 | 5 |
| j. The environment of fast food restaurants is relatively simple and safe..... | 1 | 2 | 3 | 4 | 5 |
| k. Fast food restaurants have a children's entertainment area..... | 1 | 2 | 3 | 4 | 5 |
| l. The advertising of fast foods emphasizes the presence of cheese | 1 | 2 | 3 | 4 | 5 |

**9. Do you think cheese could possibly combine with Chinese foods? *(Circle a number)***

1 YES, IT IS POSSIBLE TO CONBIME CHEESE WITH CHINESE FOODS
2 YES, BUT ONLY CERTAIN CHINESE FOODS COULD COMBINE WITH CHEESE
3 NO, IT IS IMPOSSIBLE

**10. If there were a new Chinese food specially developed for cheese, how likely would you be to try it? *(Circle a number)***

1 VERY LIKELY
2 SOMEWHAT LIKELY
3 NOT TOO LIKELY
4 NOT AT ALL LIKELY

**11. How much do you like the appearance, aroma, texture and flavor of cheese?** ***(Circle one number for each characteristic)***

| | Dislike very much | Dislike moderately | Dislike slightly | Neither like nor dislike | Like slightly | Like moderately | Like very much |
|---|---|---|---|---|---|---|---|
| a. Appearance... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Aroma..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Texture..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Flavor..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**12. Please indicate whether you disagree or agree with each of the following sensory characteristic should be expected from cheese.** ***(Circle one number for each term)***

| **Appearance** | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Yellow color..... | 1 | 2 | 3 | 4 | 5 |
| b. White color..... | 1 | 2 | 3 | 4 | 5 |
| c. Orange color..... | 1 | 2 | 3 | 4 | 5 |
| d. Oily..... | 1 | 2 | 3 | 4 | 5 |
| e. Sticky..... | 1 | 2 | 3 | 4 | 5 |
| f. Stringiness of melted cheese | 1 | 2 | 3 | 4 | 5 |
| g. Glossiness of melted cheese | 1 | 2 | 3 | 4 | 5 |
| h. Steam/smoke arising from melted cheese..... | 1 | 2 | 3 | 4 | 5 |

| **Aroma** | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Easily recognizable aroma ... | 1 | 2 | 3 | 4 | 5 |
| b. Creaminess..... | 1 | 2 | 3 | 4 | 5 |
| c. Buttery..... | 1 | 2 | 3 | 4 | 5 |
| d. Yogurt sourness..... | 1 | 2 | 3 | 4 | 5 |
| e. Saltiness..... | 1 | 2 | 3 | 4 | 5 |

| **Texture** | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Melts in mouth..... | 1 | 2 | 3 | 4 | 5 |
| b. Melts in hands..... | 1 | 2 | 3 | 4 | 5 |
| c. Powdery and grainy..... | 1 | 2 | 3 | 4 | 5 |
| d. Chewiness..... | 1 | 2 | 3 | 4 | 5 |
| e. Springiness..... | 1 | 2 | 3 | 4 | 5 |
| f. Dense and viscous..... | 1 | 2 | 3 | 4 | 5 |
| g. Moist..... | 1 | 2 | 3 | 4 | 5 |
| h. Softness..... | 1 | 2 | 3 | 4 | 5 |
| i. Smoothness..... | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| j. Stringiness (melted cheese)... | 1 | 2 | 3 | 4 | 5 |
| k. Fineness..... | 1 | 2 | 3 | 4 | 5 |

| Flavor | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Cheese flavor ..... | 1 | 2 | 3 | 4 | 5 |
| b. Saltiness..... | 1 | 2 | 3 | 4 | 5 |
| c. Dairy sourness..... | 1 | 2 | 3 | 4 | 5 |
| d. Creaminess..... | 1 | 2 | 3 | 4 | 5 |
| e. Buttery..... | 1 | 2 | 3 | 4 | 5 |
| f. Milky..... | 1 | 2 | 3 | 4 | 5 |
| g. Oily..... | 1 | 2 | 3 | 4 | 5 |
| h. Bitterness..... | 1 | 2 | 3 | 4 | 5 |
| i. Bitter and sour aftertaste..... | 1 | 2 | 3 | 4 | 5 |

**13. Please rank how important appearance, aroma, texture and flavor of cheese is to you. (where 1= most important and 4= least important)**

***Rank through 1-4 (Importance)***

a. Appearance _____
b. Aroma _____
c. Texture _____
d. Flavor _____

**14. Demographic information**

**14a What is your gender? *(Circle one number)***

1 MALE
2 FEMALE

**14b What is your occupation? *(Circle one number)***

1 STUDENT
2 NON-STUDENT

**14c What is your marital status? *(Circle one number)***

1 SINGLE
2 MARRIED

**14d What is the name of city where you live in right now? _____**

**14e Do you live with your family?** ***(Circle one number)***

1 YES
2 NO

**14f Does your living's situation have a kitchen?** ***(Circle one number)***

1 YES
2 NO

**14g How often do you shop for food within a month?** ***(Circle one number)***

1 EVERY DAY
2 ONCE EVERY THREE DAYS
3 ONCE A WEEK
4 ONCE EVERY 2 WEEKS
5 ONCE A MONTH
6 ALMOST NEVER SHOP FOR FOOD

**14h How often do you cook within a month?** ***(Circle one number)***

1 EVERY DAY
2 ONCE EVERY THREE DAYS
3 ONCE A WEEK
4 ONCE EVERY 2 WEEKS
5 ONCE A MONTH
6 ALMOST NEVER COOK AND USUALLY EAT OUT
7 ALMOT NEVER COOK AND OTHERS TAKE CARE OF COOKING AT HOME

**14i How often do you eat out within a month?** ***(Circle one number)***

1 EVERY DAY
2 ONCE EVERY THREE DAYS
3 ONCE A WEEK
4 ONCE EVERY 2 WEEKS
5 ONCE A MONTH
6 ALMOST NEVER

**14j How old are you?** ***(Circle one number)***

1 BETWEEN 16 AND 23
2 BETWEEN 23 AND 31
3 BETWEEN 32 AND 40

**Thank you very much for your time!**

Appendix 4.2. Survey questionnaire in Chinese.

編號 _____

您好！我們是美國奧勒岡州立大學食品科學系品評實驗室，我們最近正在進行一連串有關東西方文化下消費乳酪的行爲。我們想請您回答以下關於乳酪的問題，非常感謝您的參與！

乳酪(cheese)的同義字: 起士、芝士、吉士、起司

甚麼是乳酪: 片狀、塊狀、顆粒狀、粉狀或是可塗抹狀的乳製品，顏色一般是白色或橘（黃）色，放在超市的冷藏櫃中販賣，通常會跟牛奶、優格、布丁放在一起

1. 在過去一年之內，您（或是您的家人室友）曾經在超市、大賣場或是便利商店購買乳酪嗎？之後，您會在家中製備食用乳酪或是含有乳酪的食物嗎？（請圈選一個答案）

1 沒有（請至第 2 題作答）
2 有，而且是固定購買以及固定在家中製備食用（請至第 1a 題作答）
3 有，但是不固定的購買,也不固定的在家中製備食用（請至第 1a 題作答）

**1a** 您平均多久在家製備食用一次乳酪或是含有乳酪的食物（包括在家裡準備好之後帶到外面吃的食物，但不包括從外帶回家食用的含有乳酪食物）？（請圈選一個最符合的答案）

1 每天一次
2 三天一次
3 每週一次
4 每兩週一次
5 每月一次
6 每三個月一次
7 每半年一次
8 每年一次

**1b** 您有多常在以下的時段再家製備食用乳酪或是含有乳酪的食物 **(包括在家裡準備好之後帶到外面吃的食物，但不包括從外帶回家食用的含有乳酪食物）？（請圈選一個最符合的答案）)**

| | 從來沒有 | 很少 | 有時候 | 經常 |
|---|---|---|---|---|
| a. 早餐…… | **1** | **2** | **3** | **4** |
| b. 午餐…… | **1** | **2** | **3** | **4** |
| c. 晚餐…… | **1** | **2** | **3** | **4** |
| d. 點心*…… | **1** | **2** | **3** | **4** |
| e. 零食**…… | **1** | **2** | **3** | **4** |

*點心（在三餐之間食用，包括宵夜）
**零食（爲了滿足口慾）

**1c** 您有多常在家製備食用以下含有乳酪的食物（包括在家裡準備好之後帶到外面吃的食物，但不包括從外面買回來含有乳酪的食品）？（請在每樣食物中圈選一個最符合的答案）

| | 從來沒有 | 很少 | 有時候 | 經常 |
|---|---|---|---|---|
| a. 單吃乳酪,沒有加入其他的食物…… | 1 | 2 | 3 | 4 |
| b. 乳酪三明治…… | 1 | 2 | 3 | 4 |
| c. 焗烤（飯、麵、白菜、海鮮…）…… | 1 | 2 | 3 | 4 |
| d. 披薩…… | 1 | 2 | 3 | 4 |
| e. 漢堡…… | 1 | 2 | 3 | 4 |
| f. 乳酪蛋糕…… | 1 | 2 | 3 | 4 |
| g. 貝菓(Bagel, 一種中央有洞的的麵包)… | 1 | 2 | 3 | 4 |
| h. 法國麵包…… | 1 | 2 | 3 | 4 |
| i. 義大利麵…… | 1 | 2 | 3 | 4 |
| j. 沙拉（用粉狀或是絲狀的乳酪加在上面）… | 1 | 2 | 3 | 4 |
| k. 乳酪配紅白酒…… | 1 | 2 | 3 | 4 |

**1d** 下列哪一個種類的乳酪您最常在家製備食用？（請圈選一個答案）

1 再製乳酪 PROCESSED CHEESE
2 美國乳酪 AMERICAN CHEESE
3 切達乳酪 CHEDDAR CHEESE
4 蒙特瑞傑克乳酪 MONTEREY JACK CHEESE
5 卡拜乳酪 COLBY CHEESE
6 義大利白乾酪 MOZZARELLA
7 巴馬乾酪 PARMESAN
8 奶油乳酪、凝脂乳酪 CREAM CHEESE
9 蜂窩乳酪、瑞士乳酪 SWISS CHEESE
10 我不知道我曾吃過乳酪的種類和名字

**1e** 您有多常在家製備食用下列這些形狀的乳酪？（請在每種形狀中圈選一個最符合的答案）

| | 從來沒有 | 很少 | 有時候 | 經常 |
|---|---|---|---|---|
| a. 片狀…… | 1 | 2 | 3 | 4 |
| b. 絲狀（潮濕的）… | 1 | 2 | 3 | 4 |
| c. 粉狀（乾燥的）… | 1 | 2 | 3 | 4 |
| d. 可塗抹果醬式乳酪 | 1 | 2 | 3 | 4 |
| e. 塊狀…… | 1 | 2 | 3 | 4 |
| f. 條狀…… | 1 | 2 | 3 | 4 |
| g. 糖果餅乾大小形狀 | 1 | 2 | 3 | 4 |

**1f** 哪一種包裝大小的乳酪您最常在家食用？（請圈選一個答案）

1 小包裝（低於 500 公克、片狀 12 片以下的乳酪）
2 中型包裝（介於 500 克到 1 公斤之間、16 片或是 24 片左右的乳酪）
3 大型包裝（超過 1 公斤、或是超過 24 片以上的乳酪包裝）

**2.** 請您用 **1** 到 **7** 分評斷下列的因素如何會影響您在超市、大賣場或是便利商店購買乳酪的決定（**1=** 一點都不會影響，**7=** 非常會影響）（請在每個因素中圈選一個最符合的答案）

| | 一點都不會影響 | | | | | | 非常會影響 |
|---|---|---|---|---|---|---|---|
| a. 外觀（看到的樣子）…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. 氣味（聞到的味道）…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. 組織口感、質地…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. 口味（嚐到的味道）…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e. 形狀（片狀、塊狀、絲狀、粉狀…）…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| f. 顏色（黃色、白色…）…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| g. 包裝的狀態（真空包裝、片狀的每一片用塑膠膜包起來…） | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| h. 包裝的設計跟印刷…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| i. 包裝大小…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| j. 健康因素（鈣質、脂肪量…） | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| k. 使用時的方便程度…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| l. 品牌…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| m. 他人推薦…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| n. 廣告宣傳…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| o. 促銷…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| p. 價格…… | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**3.** 在過去一年之內，您曾經在外面（餐廳、速食店、早餐店等等）吃過乳酪或是含有乳酪的食物嗎（例如漢堡、披薩、義大利麵等等）？（包括購買後外帶的食物）（請圈選一個答案）

1 沒有（請至第 **4** 題作答）
2 有（請至第 **3a** 題作答）

**3a** 您平均多久在外面（餐廳、速食店、早餐店等等）吃過乳酪或是含有乳酪的食物（例如漢堡、披薩、義大利麵等等）？（包括購買後外帶的食物）（請圈選一個最符合的答案）

1 每天一次
2 三天一次
3 每週一次
4 每兩週一次
5 每月一次
6 每三個月一次
7 每半年一次
8 每年一次

**3b** 您有多常在以下的時段再家製備食用乳酪或是含有乳酪的食物 **(**包括在家裡準備好之後帶到外面吃的食物，但不包括從外帶回家食用的含有乳酪食物）？（請圈選一個最符合的答案）**)**

| | 從來沒有 | 很少 | 有時候 | 經常 |
|---|---|---|---|---|
| a. 早餐…… | **1** | **2** | **3** | **4** |
| b. 午餐…… | **1** | **2** | **3** | **4** |
| c. 晚餐…… | **1** | **2** | **3** | **4** |
| d. 點心*…… | **1** | **2** | **3** | **4** |
| e. 零食**…… | **1** | **2** | **3** | **4** |

*點心（在三餐之間食用，包括宵夜）
**零食（爲了滿足口慾）

**3c** 您有多常在在外面（餐廳、速食店、早餐店等等）食用以下含有乳酪的食物（包括購買後外帶的食物）？（請在每樣食物中圈選一個最符合的答案）

| | 從來沒有 | 很少 | 有時候 | 經常 |
|---|---|---|---|---|
| a. 單吃乳酪,沒有加入其他的食物…… | **1** | **2** | **3** | **4** |
| b. 乳酪三明治…… | **1** | **2** | **3** | **4** |
| c. 焗烤（飯、麵、白菜、海鮮…）…… | **1** | **2** | **3** | **4** |
| d. 披薩…… | **1** | **2** | **3** | **4** |
| e. 漢堡…… | **1** | **2** | **3** | **4** |
| f. 乳酪蛋糕…… | **1** | **2** | **3** | **4** |

| | | | | | |
|---|---|---|---|---|---|
| g. | 貝菓(Bagel, 一種中央有洞的的麵包)... | 1 | 2 | 3 | 4 |
| h. | 法國麵包..... | 1 | 2 | 3 | 4 |
| i. | 義大利麵..... | 1 | 2 | 3 | 4 |
| j. | 沙拉（用粉狀或是絲狀的乳酪加在上面）... | 1 | 2 | 3 | 4 |
| k. | 乳酪配紅白酒..... | 1 | 2 | 3 | 4 |

**4.** 您比較常在家中製備食用或是在外面(餐廳, 速食店,早餐店等等)食用乳酪或是含有乳酪的食物(例如漢堡、披薩、義大利麵等等)？（請圈選一個答案）

1 只在外面食用
2 在外面食用比在家中製備食用的機會高
3 在外面食用跟在家中製備食用的機會差不多
4 在外面食用比在家中製備食用的機會低
5 只在家裡製備食用

**5.** 您（在家或是在外面）比較常吃沒有融化的乳酪還是（完全或部分）融化的乳酪？（請圈選一個答案）

1 只食用（完全或部分）融化的乳酪
2 食用（完全或部分）融化的乳酪的機會比沒有融化的乳酪高
3 食用（完全或部分）融化的乳酪的機會比沒有融化的乳酪差不多
4 食用（完全或部分）融化的乳酪的機會比沒有融化的乳酪低
5 只食用沒有融化的乳酪

**6.** 您比較常單吃乳酪還是含有乳酪的食物？（請圈選一個答案）

1 只食用含有乳酪的食物
2 食用含有乳酪的食物的機會比單吃乳酪高
3 食用含有乳酪的食物的機會跟單吃乳酪差不多
4 食用含有乳酪的食物的機會比單吃乳酪低
5 只單吃乳酪

7. 和您相比,您覺得您的父母長輩接受乳酪的程度是如何？（請圈選一個最符合的答案）

1 他們絕對不會接受乳酪
2 他們的接受度比自己低很多
3 他們的接受度比自己低一點
4 他們的接受度跟自己差不多
5 他們的接受度比自己高一點
6 他們的接受度比自己高很多

**8.** 請指出您是否同意以下和速食（漢堡跟披薩）有關的描述（請在每段描述中圈選一個最符合的答案）

| | 非常不同意 | 不同意 | 無意見 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| a. 乳酪是食用速食的原因之一 | 1 | 2 | 3 | 4 | 5 |
| b. 披薩很美味很好吃 | 1 | 2 | 3 | 4 | 5 |
| c. 乳酪漢堡很美味很好吃 | | | | | |
| d. 吃速食很方便 | 1 | 2 | 3 | 4 | 5 |
| e. 吃速食是一種流行 | 1 | 2 | 3 | 4 | 5 |
| f. 青年、青少年跟兒童經常到速食店去消費 | 1 | 2 | 3 | 4 | 5 |
| g. 青年、青少年跟兒童會因爲玩具玩偶去速食店消費 | 1 | 2 | 3 | 4 | 5 |
| h. 速食店歡迎學生討論作業功課 | 1 | 2 | 3 | 4 | 5 |
| i. 速食店是青年跟青少年聚會的好地方 | 1 | 2 | 3 | 4 | 5 |
| j. 速食店的環境單純安全 | 1 | 2 | 3 | 4 | 5 |
| k. 速食店有兒童遊樂區 | 1 | 2 | 3 | 4 | 5 |
| l. 速食的宣傳廣告中會強調乳酪的存在 | 1 | 2 | 3 | 4 | 5 |

**9.** 您認爲乳酪可不可能跟中國食物合併在一起？（請圈選一個答案）

1 乳酪跟中國食物完全可以合併在一起
2 乳酪可以跟某些類型的中國食物合併在一起
3 乳酪跟中國食物絕對不可能合併在一起

**10.** 如果有特別爲了乳酪而設計的新中國菜問世，您會多想要嘗試看看？（請圈選一個答案）

1 非常想要嘗試
2 有點想要嘗試
3 不是很想嘗試
4 完全不想嘗試

**11.** 您有多喜歡乳酪的外觀、氣味、組織口感以及口味？請根據您喜歡的程度進行評分

| | 非常討厭 | 普通討厭 | 有一點討厭 | 不喜歡也不討厭 | 有一點喜歡 | 普通喜歡 | 非常喜歡 |
|---|---|---|---|---|---|---|---|
| a. 外觀（看到的樣子）... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. 氣味（聞到的味道）... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. 組織口感、質地..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. 口味（嚐到的味道）... | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**12.** 請指出您是否同意下列對乳酪外觀,氣味,組織口感跟口味的描述詞是它應該要具備的條件（請在每個描述詞中圈選 一個最符合的答案）

| 外觀 | 非常不同意 | 不同意 | 無意見 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| a. 黃色 | 1 | 2 | 3 | 4 | 5 |
| b. 白色 | 1 | 2 | 3 | 4 | 5 |
| c. 橘色 | 1 | 2 | 3 | 4 | 5 |
| d. 看起來油油的 | 1 | 2 | 3 | 4 | 5 |
| e. 看起來粘粘的 | 1 | 2 | 3 | 4 | 5 |
| f. 融化的乳酪看到牽絲 | 1 | 2 | 3 | 4 | 5 |
| g. 融化的乳酪會發亮 | 1 | 2 | 3 | 4 | 5 |
| h. 融化的乳酪會冒煙 | 1 | 2 | 3 | 4 | 5 |

| 氣味 | 非常不同意 | 不同意 | 無意見 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| a. 氣味強到容易辨別是不是乳酪 | 1 | 2 | 3 | 4 | 5 |
| b. 奶香味 | 1 | 2 | 3 | 4 | 5 |
| c. 牛油味 | 1 | 2 | 3 | 4 | 5 |
| d. 優格的酸味 | 1 | 2 | 3 | 4 | 5 |
| e. 鹹味 | 1 | 2 | 3 | 4 | 5 |

| 質地口感 | 非常不同意 | 不同意 | 無意見 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| a. 在嘴巴內融化 | 1 | 2 | 3 | 4 | 5 |
| b. 在手上融化 | 1 | 2 | 3 | 4 | 5 |
| c. 粉狀和顆粒狀 | 1 | 2 | 3 | 4 | 5 |
| d. 嚼勁 | 1 | 2 | 3 | 4 | 5 |
| e. 彈性 | 1 | 2 | 3 | 4 | 5 |
| f. 粘稠 | 1 | 2 | 3 | 4 | 5 |
| g. 潮濕 | 1 | 2 | 3 | 4 | 5 |
| h. 柔軟 | 1 | 2 | 3 | 4 | 5 |
| i. 滑嫩順口 | 1 | 2 | 3 | 4 | 5 |
| j. 融化的乳酪有牽絲 | 1 | 2 | 3 | 4 | 5 |
| k. 細緻 | 1 | 2 | 3 | 4 | 5 |

| 口味 | 非常不同意 | 不同意 | 無意見 | 同意 | 非常同意 |
|---|---|---|---|---|---|
| a. 乳酪的味道 | 1 | 2 | 3 | 4 | 5 |
| b. 鹹味 | 1 | 2 | 3 | 4 | 5 |
| c. 乳製品發酵的酸味 | 1 | 2 | 3 | 4 | 5 |
| d. 奶香味 | 1 | 2 | 3 | 4 | 5 |
| e. 牛油味 | 1 | 2 | 3 | 4 | 5 |
| f. 牛奶味 | 1 | 2 | 3 | 4 | 5 |
| g. 油味 | 1 | 2 | 3 | 4 | 5 |
| h. 苦味 | 1 | 2 | 3 | 4 | 5 |
| i. 酸跟苦的餘味殘留在嘴巴裡 | 1 | 2 | 3 | 4 | 5 |

**13.** 請按照您認爲的重要性將乳酪的外觀、氣味、組織口感以及口味排序（**1=** 最重要、**4=** 最不重要）

| | 排序（從 **1** 到 **4**） |
|---|---|
| a. 外觀 | _____ |
| b. 氣味 | _____ |
| c. 質地口感 | _____ |
| d. 口味 | _____ |

**14.** 個人基本資料

**14a** 您的性別（請圈選一個答案）

3 男
4 女

**14b** 您的職業（請圈選一個答案）

1 學生
2 非學生

**14c** 您的婚姻狀況（請圈選一個答案）

3 未婚
4 已婚

**14d** 您現在居住的城市名稱_____

**14e** 您跟家人一起住嗎？（請圈選一個答案）

3 是
4 不是

**14f** 您住的地方有廚房嗎？（請圈選一個答案）

3 有
4 沒有

**14g** 在過去一個月內，您大約多久買一次菜？（請圈選一個答案）

7 每天
8 每三天一次
9 每週一次
10 每兩週一次
11 每月一次
12 幾乎沒去買過菜

**14h** 在過去一個月內，您大約多久煮一次菜？（請圈選一個答案）

8 每天
9 每三天一次
10 每週一次
11 每兩週一次
12 每月一次
13 幾乎不煮菜因爲天天在外面吃
14 幾乎不煮菜因爲有人會煮給我吃

**14i** 在過去一個月內，您大約多久外食一次？（請圈選一個答案）

7 每天
8 每三天一次
9 每週一次
10 每兩週一次
11 每月一次
12 幾乎不外食

**14j** 您的年齡（請圈選一個答案）

1 介於 16 至 23 歲
2 介於 24 至 31 歲
3 介於 32 至 40 歲

非常感謝您利用寶貴的時間填寫這份問卷！

Appendix 4.3. Survey screening questions.

In Taipei area (大台北地區):

1. Have you eaten cheese or foods containing cheese at home or in restaurants or both in the past year?
   Yes (go to 2)
   No (Thank you very much!)

2. Where do you live right now?
   Taipei City (go to 3)
   Taipei County (go to 4)
   Taoyuan County (go to 5)
   Keelung City (go to 6)
   Others (Thank you very much!)

3. Which region in Taipei City do you live right now?
   Daan Region (go to 6)
   Shihlin Region (go to 6)
   Wenshan Region (go to 6)
   Neihu Region (go to 6)
   Beitou Region (go to 6)
   Hsinyi Region (go to 6)
   Chungshan Region (go to 6)
   Others (Thank you very much!)

4. Which region in Taipei County do you live right now?
   Banchiao City (go to 6)
   Chunghe City (go to 6)
   Sanchung City (go to 6)
   HsinChuang City (go to 6)
   Hsindian City (go to 6)
   Yunghe City (go to 6)
   Others (Thank you very much!)

5. Which region in Taoyuan County do you live right now?
   Taoyuan City (go to 6)
   Chungli City (go to 6)
   Others (Thank you very much!)

6. How old are you?
   Below 16 years old (Thank you very much!)
   16-40 years old (You are qualified to our survey!)
   Over 40 years old (Thank you very much!)

1. 您在最近一年之內在家或是在餐廳食用過乳酪或是含有乳酪的食品嗎?
   有 (請至第二題)
   沒有 (感謝您的幫忙!)

2. 您現在住在哪裡?
   台北市 (請至第三題)
   台北縣 (請至第四題)
   桃園縣 (請至第五題)
   基隆市 (請至第六題)
   其他 (感謝您的幫忙)

3. 您現在住在台北市哪區?

   大安區 (請至第六題)
   士林區 (請至第六題)
   文山區 (請至第六題)
   內湖區 (請至第六題)
   北投區 (請至第六題)
   信義區 (請至第六題)
   中山區 (請至第六題)
   其他 (感謝您的幫忙)

4. 您現在住在台北縣哪裡?

   板橋市 (請至第六題)
   中和市 (請至第六題)
   三重市 (請至第六題)
   新莊市 (請至第六題)
   新店市 (請至第六題)
   永和市 (請至第六題)
   其他 (感謝您的幫忙)

5. 您現在住在桃園縣哪裡?

   桃園市 (請至第六題)
   中壢市 (請至第六題)
   其他 (感謝您的幫忙)

6. 您的年齡
   低於 16 歲 (感謝您的幫忙)
   介於 16 至 40 歲 (這裡是您的問卷,請填妥之後交還,謝謝!)
   高於 40 歲 (感謝您的幫忙)

In Taichung area (大台中地區):

1. Have you eaten cheese or foods containing cheese at home or in restaurants or both in the past year?
   Yes (go to 2)
   No (Thank you very much!)

2. Where do you live right now?
   Taichung City (go to 6)
   Taichung Chen (go to 3)
   Changhua Chen (go to 4)
   Nantou Chen (go to 5)
   Others (Thank you very much!)

3. Which region in Taichung County do you live right now?
   Fengyaun City (go to 6)
   Dali City (go to 6)
   Taiping City (go to 6)
   Tantsu Hsiang (go to 6)
   Daya Hsiang (go to 6)
   Others (Thank you very much!)

4. Which region in Changhwa County do you live right now?
   Changhwa City (go to 6)
   Yuanlin Chen (go to 6)
   Others (Thank you very much!)

5. Which region in Nantou County do you live right now?
   Nantou City (go to 6)
   Others (Thank you very much!)

6. How old are you?
   Below 16 years old (Thank you very much!)
   16-40 years old (You are qualified to our survey!)
   Over 40 years old (Thank you very much!)

1. 您在最近一年之內在家或是在餐廳食用過乳酪或是含有乳酪的食品嗎?
   有 (請至第二題)
   沒有 (感謝您的幫忙!)

2. 您現在住在哪裡?
   台中市 (請至第六題)
   台中縣 (請至第三題)
   彰化縣 (請至第四題)
   南投縣 (請至第五題)
   其他 (感謝您的幫忙)

3. 您現在住在台中縣哪裡?

   豐原市 (請至第六題)
   大里市 (請至第六題)
   太平市 (請至第六題)
   潭子鄉 (請至第六題)
   大雅鄉 (請至第六題)
   其他 (感謝您的幫忙)

4. 您現在住在彰化縣哪裡?

   彰化市 (請至第六題)
   員林鎮 (請至第六題)
   其他 (感謝您的幫忙)

5. 您現在住在南投縣哪裡?

   南投市 (請至第六題)
   其他 (感謝您的幫忙)

6. 您的年齡
   低於 16 歲 (感謝您的幫忙)
   介於 16 至 40 歲 (這裡是您的問卷,請填妥之後交還,謝謝!)
   高於 40 歲 (感謝您的幫忙)

# Appendix 4.4. Data tables from consumer survey results

Table 1. Subjects' consumption frequency of cheese at five occasions at home.

| Occasion | Never | | Rarely | | Sometimes | | Often | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | |
| Breakfast | 93 | 18.8% | 152 | 30.8% | 178 | 36.0% | 71 | 14.4% | 494 |
| Lunch | 207 | 41.9% | 195 | 39.5% | 85 | 17.2% | 7 | 1.4% | 494 |
| Dinner | 206 | 42.0% | 181 | 36.9% | 94 | 19.1% | 10 | 2.0% | 491 |
| Dessert | 152 | 31.0% | 167 | 34.1% | 143 | 29.2% | 28 | 5.7% | 490 |
| Snack | 161 | 32.6% | 151 | 30.6% | 149 | 30.2% | 33 | 6.7% | 494 |

Chi square= 197.328; d.f.= 12; p<0.001

Table 2. Subjects' consumption frequency of cheese at five occasions at restaurants.

| Occasion | Never | | Rarely | | Sometimes | | Often | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | |
| Breakfast | 124 | 18.0% | 222 | 32.2% | 244 | 35.4% | 99 | 14.4% | 689 |
| Lunch | 123 | 17.8% | 306 | 44.2% | 244 | 35.3% | 19 | 2.7% | 692 |
| Dinner | 116 | 16.8% | 270 | 39.2% | 258 | 37.4% | 45 | 6.5% | 689 |
| Dessert | 234 | 34.0% | 249 | 36.1% | 166 | 24.1% | 40 | 5.8% | 689 |
| Snack | 253 | 36.8% | 224 | 32.6% | 160 | 23.3% | 50 | 7.3% | 687 |

Chi square= 237.182; d.f.= 12; p<0.001

Table3. Subjects' consumption frequency of 11 selected food items containing cheese at home.

| Food item | Never | | Rarely | | Sometimes | | Often | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | |
| Cheese only | 252 | 50.8% | 162 | 32.7% | 60 | 12.1% | 22 | 4.4% | 496 |
| Cheese sandwich | 57 | 11.5% | 125 | 25.2% | 214 | 43.1% | 101 | 20.3% | 497 |
| Au gratin foods | 182 | 36.7% | 135 | 27.2% | 129 | 26.0% | 50 | 10.1% | 496 |
| Frozen pizza | 232 | 46.8% | 133 | 26.8% | 92 | 18.5% | 39 | 7.9% | 496 |
| Hamburger | 251 | 51.0% | 115 | 23.4% | 90 | 18.3% | 36 | 7.3% | 492 |
| Cheesecake | 342 | 69.1% | 83 | 16.8% | 41 | 8.3% | 29 | 5.9% | 495 |
| Bagel | 322 | 64.9% | 105 | 21.2% | 60 | 12.1% | 9 | 1.8% | 496 |
| Baguette | 290 | 58.6% | 111 | 22.4% | 79 | 16.0% | 15 | 3.0% | 495 |
| Spaghetti | 229 | 46.4% | 121 | 24.5% | 106 | 21.5% | 38 | 7.7% | 494 |
| Salad | 248 | 50.0% | 127 | 25.6% | 100 | 20.2% | 21 | 4.2% | 496 |
| Cheese with wine | 406 | 81.9% | 67 | 13.5% | 17 | 3.4% | 6 | 1.2% | 496 |

Chi square= 882.023; d.f.= 30; $p<0.001$

Table 4. Subjects' consumption frequency of 11 selected food items containing cheese at restaurants.

| Food item | Never | | Rarely | | Sometimes | | Often | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | |
| Cheese only | 450 | 65.7% | 175 | 25.5% | 52 | 7.6% | 8 | 1.2% | 685 |
| Cheese sandwich | 40 | 5.8% | 193 | 28.1% | 325 | 47.2% | 130 | 18.9% | 688 |
| Au gratin foods | 79 | 11.5% | 219 | 31.9% | 295 | 42.9% | 94 | 13.7% | 687 |
| Pizza | 39 | 5.7% | 207 | 30.0% | 323 | 46.8% | 121 | 17.5% | 690 |
| Hamburger | 63 | 9.2% | 198 | 28.8% | 311 | 45.2% | 116 | 16.9% | 688 |
| Cheesecake | 91 | 13.2% | 216 | 31.3% | 265 | 38.5% | 117 | 17.0% | 689 |
| Bagel | 350 | 51.0% | 212 | 30.9% | 103 | 15.0% | 21 | 3.1% | 686 |
| Baguette | 248 | 36.3% | 281 | 41.1% | 135 | 19.7% | 20 | 2.9% | 684 |
| Spaghetti | 156 | 22.7% | 236 | 34.3% | 220 | 32.0% | 76 | 11.0% | 688 |
| Salad | 239 | 34.8% | 248 | 36.2% | 160 | 23.3% | 39 | 5.7% | 686 |
| Cheese with wine | 529 | 77.0% | 114 | 16.6% | 36 | 5.2% | 8 | 1.2% | 687 |

Chi square= 2466.905; d.f.= 30; $p<0.001$

Table 5. Subjects' consumption frequency of the cheese types at home.

| Cheese Type | Never | | Rarely | | Sometimes | | Often | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | |
| Sliced cheese | 76 | 15.1% | 143 | 28.5% | 158 | 31.5% | 125 | 24.9% | 502 |
| Shredded cheese | 264 | 53.4% | 143 | 28.9% | 73 | 14.8% | 14 | 2.8% | 494 |
| Grated cheese | 277 | 56.0% | 131 | 26.5% | 69 | 13.9% | 18 | 3.6% | 495 |
| Cheese spread | 212 | 42.8% | 135 | 27.3% | 113 | 22.8% | 35 | 7.1% | 495 |
| Chunk cheese | 256 | 51.8% | 133 | 26.9% | 81 | 16.4% | 24 | 4.9% | 494 |
| Cheese bar | 269 | 54.3% | 132 | 26.7% | 81 | 16.4% | 13 | 2.6% | 495 |
| Candy-like cheese | 325 | 65.7% | 107 | 21.6% | 52 | 10.5% | 11 | 2.2% | 495 |

Chi square= 535.411; d.f.= 18; $p<0.001$

Table 6. Influence on decision-making of the 16 product characteristics when subjects purchase cheese in supermarkets.

| Factor | Not at all | | | | | | Very much | Lowly influencial | | Somewhat influencial | | Highly influential | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1+2 | % | 3+4+5 | % | 6+7 | % | |
| Appearance | 82 | 68 | 113 | 139 | 131 | 87 | 144 | 150 | 19.6% | 383 | 50.1% | 231 | 30.2% | 764 |
| Aroma | 61 | 33 | 66 | 120 | 138 | 129 | 218 | 94 | 12.3% | 324 | 42.4% | 347 | 45.4% | 765 |
| Texture | 60 | 23 | 54 | 99 | 138 | 158 | 234 | 83 | 10.8% | 291 | 38.0% | 392 | 51.2% | 766 |
| Flavor | 46 | 28 | 42 | 80 | 119 | 144 | 301 | 74 | 9.7% | 241 | 31.7% | 445 | 58.6% | 760 |
| Form | 118 | 95 | 103 | 173 | 126 | 86 | 64 | 213 | 27.8% | 402 | 52.5% | 150 | 19.6% | 765 |
| Cheese color | 158 | 105 | 116 | 136 | 107 | 72 | 68 | 263 | 34.5% | 359 | 47.1% | 140 | 18.4% | 762 |
| Package condition | 86 | 55 | 100 | 165 | 132 | 105 | 120 | 141 | 18.5% | 397 | 52.0% | 225 | 29.5% | 763 |
| Package design and printing | 111 | 79 | 125 | 183 | 149 | 65 | 51 | 190 | 24.9% | 457 | 59.9% | 116 | 15.2% | 763 |
| Package size | 97 | 60 | 99 | 181 | 151 | 96 | 80 | 157 | 20.5% | 431 | 56.4% | 176 | 23.0% | 764 |
| Health concern | 51 | 25 | 49 | 125 | 130 | 157 | 227 | 76 | 9.9% | 304 | 39.8% | 384 | 50.3% | 764 |
| Usage convenience | 51 | 25 | 38 | 144 | 166 | 169 | 170 | 76 | 10.0% | 348 | 45.6% | 339 | 44.4% | 763 |
| Brand | 94 | 48 | 85 | 171 | 150 | 127 | 89 | 142 | 18.6% | 406 | 53.1% | 216 | 28.3% | 764 |
| Recommendation | 96 | 62 | 99 | 161 | 164 | 115 | 65 | 158 | 20.7% | 424 | 55.6% | 180 | 23.6% | 762 |
| Advertising | 123 | 83 | 119 | 160 | 136 | 87 | 55 | 206 | 27.0% | 415 | 54.4% | 142 | 18.6% | 763 |
| Promotion | 96 | 73 | 106 | 164 | 135 | 108 | 81 | 169 | 22.1% | 405 | 53.1% | 189 | 24.8% | 763 |
| Price | 47 | 28 | 55 | 114 | 154 | 148 | 217 | 75 | 9.8% | 323 | 42.3% | 365 | 47.8% | 763 |

Chi square= 1195.285; d.f = 30; $p<0.001$

Table 7. Subjects' attitudes toward fast foods.

| Statement related to fast foods | SD | D | N | A | SA | Reject | | Neutral | | Accept | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | SD+D | % | N | % | A+SA | % | |
| Cheese is one of the reasons to consume fast foods | 57 | 164 | 276 | 230 | 37 | 221 | 28.9% | 276 | 36.1% | 267 | 34.9% | 764 |
| Pizza is delicious | 23 | 47 | 156 | 382 | 154 | 70 | 9.2% | 156 | 20.5% | 536 | 70.3% | 762 |
| A cheeseburger is delicious | 23 | 53 | 259 | 327 | 100 | 76 | 10.0% | 259 | 34.0% | 427 | 56.0% | 762 |
| Fast food is convenient | 20 | 37 | 157 | 427 | 124 | 57 | 7.5% | 157 | 20.5% | 551 | 72.0% | 765 |
| Eating fast foods is fashionable | 44 | 124 | 308 | 247 | 42 | 168 | 22.0% | 308 | 40.3% | 289 | 37.8% | 765 |
| Young adults, teenagers and children go to fast food restaurants often | 18 | 33 | 128 | 398 | 186 | 51 | 6.7% | 128 | 16.8% | 584 | 76.5% | 763 |
| Young adults, teenager and children are attracted by toys inside combo package | 20 | 60 | 183 | 385 | 116 | 80 | 10.5% | 183 | 24.0% | 501 | 65.6% | 764 |
| Fast food restaurants welcome students to discuss assignments | 31 | 119 | 268 | 264 | 81 | 150 | 19.7% | 268 | 35.1% | 345 | 45.2% | 763 |
| Fast food restaurants are good for having fun with friends for young adults and teenagers | 33 | 49 | 182 | 375 | 124 | 82 | 10.7% | 182 | 23.9% | 499 | 65.4% | 763 |
| The environment of fast food restaurants is relatively simple and safe | 33 | 132 | 258 | 284 | 56 | 165 | 21.6% | 258 | 33.8% | 340 | 44.6% | 763 |
| Fast food restaurants have children's entertainment area | 19 | 29 | 194 | 391 | 130 | 48 | 6.3% | 194 | 25.4% | 521 | 68.3% | 763 |
| The advertising of fast foods emphasizes the presence of cheese | 73 | 237 | 308 | 133 | 12 | 310 | 40.6% | 308 | 40.4% | 145 | 19.0% | 763 |

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree
Chi-square= 1287.717; d.f.= 22; $p<0.001$

Table 8. Subjects' overall preference regarding sensory characteristics of cheese.

| Sensory characteristics | DVM | DM | DS | N | LS | LM | LVM | Dislike | | Neutral | | Like | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | DVM+DM+DS | % | N | % | LS+LM+LVM | % | |
| **Appearance** | 10 | 25 | 29 | 319 | 183 | 143 | 59 | 64 | 8.3% | 319 | 41.5% | 385 | 50.1% | 768 |
| **Aroma** | 13 | 23 | 99 | 215 | 174 | 149 | 95 | 135 | 17.6% | 215 | 28.0% | 418 | 54.4% | 768 |
| **Texture** | 10 | 21 | 30 | 201 | 170 | 182 | 154 | 61 | 7.9% | 201 | 26.2% | 506 | 65.9% | 768 |
| **Flavor** | 13 | 20 | 39 | 164 | 169 | 188 | 176 | 72 | 9.4% | 164 | 21.3% | 533 | 69.3% | 769 |

DVM= dislike very much
DM= dislike moderately
DS= dislike slightly
N= neither like nor dislike
LS= like slightly
LM= like moderately
LVM= like very much
Chi square= 210.032; d.f.= 18; p<0.001

Chi square= 135.310; p<0.001

Table 9. Subjects' agreements regarding the descriptors of cheese appearance.

| Descriptor | SD | D | N | A | SA | Reject | | Neutral | | Accept | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | SD+D | % | N | % | A+SA | % | |
| Yellow color | 16 | 35 | 358 | 283 | 66 | 51 | 6.7% | 358 | 47.2% | 349 | 46.0% | 758 |
| White color | 20 | 50 | 435 | 215 | 37 | 70 | 9.2% | 435 | 57.5% | 252 | 33.3% | 757 |
| Orange color | 29 | 99 | 453 | 151 | 25 | 128 | 16.9% | 453 | 59.8% | 176 | 23.2% | 757 |
| Oily | 69 | 313 | 284 | 78 | 14 | 382 | 50.4% | 284 | 37.5% | 92 | 12.1% | 758 |
| Sticky | 75 | 262 | 261 | 139 | 21 | 337 | 44.5% | 261 | 34.4% | 160 | 21.1% | 758 |
| Stringiness of melted cheese | 38 | 82 | 220 | 293 | 126 | 120 | 15.8% | 220 | 29.0% | 419 | 55.2% | 759 |
| Glossiness of melted cheese | 25 | 61 | 297 | 286 | 88 | 86 | 11.4% | 297 | 39.2% | 374 | 49.4% | 757 |
| Steam/smoke arising from melted cheese | 65 | 174 | 371 | 99 | 48 | 239 | 31.6% | 371 | 49.0% | 147 | 19.4% | 757 |

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree
Chi-square= 1200.211; d.f.= 14; p<0.001

Table 10. Subjects' agreements regarding the descriptors of cheese aroma.

| Descriptor | SD | D | N | A | SA | Reject | | Neutral | | Accept | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | SD+D | % | N | % | A+SA | % | |
| Easily recognizable aroma | 32 | 155 | 270 | 256 | 44 | 187 | 24.7% | 270 | 35.7% | 300 | 39.6% | 757 |
| Creaminess | 12 | 21 | 118 | 476 | 132 | 33 | 4.3% | 118 | 15.5% | 608 | 80.1% | 759 |
| Buttery | 35 | 123 | 261 | 276 | 61 | 158 | 20.9% | 261 | 34.5% | 337 | 44.6% | 756 |
| Yogurt sourness | 60 | 198 | 277 | 183 | 39 | 258 | 34.1% | 277 | 36.6% | 222 | 29.3% | 757 |
| Saltiness | 50 | 142 | 298 | 240 | 26 | 192 | 25.4% | 298 | 39.4% | 266 | 35.2% | 756 |

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree
Chi-square= 516.476; d.f.= 8; p<0.001

Table 11. Subjects' agreements regarding the descriptors of cheese texture.

| Descriptor | SD | D | N | A | SA | Reject | | Neutral | | Accept | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | SD+D | % | N | % | A+SA | % | |
| Melted in mouth | 14 | 28 | 191 | 427 | 99 | 42 | 5.5% | 191 | 25.2% | 526 | 69.3% | 759 |
| Melted in hands | 66 | 279 | 291 | 103 | 17 | 345 | 45.6% | 291 | 38.5% | 120 | 15.9% | 756 |
| Powdery and grainy | 38 | 143 | 401 | 145 | 29 | 181 | 23.9% | 401 | 53.0% | 174 | 23.0% | 756 |
| Chewiness | 26 | 60 | 294 | 310 | 65 | 86 | 11.4% | 294 | 38.9% | 375 | 49.7% | 755 |
| Springiness | 18 | 44 | 244 | 367 | 82 | 62 | 8.2% | 244 | 32.3% | 449 | 59.5% | 755 |
| Dense and viscous | 26 | 112 | 284 | 264 | 69 | 138 | 18.3% | 284 | 37.6% | 333 | 44.1% | 755 |
| Moist | 44 | 193 | 312 | 168 | 39 | 237 | 31.3% | 312 | 41.3% | 207 | 27.4% | 756 |
| Softness | 10 | 21 | 201 | 419 | 106 | 31 | 4.1% | 201 | 26.6% | 525 | 69.4% | 757 |
| Smoothness | 9 | 13 | 146 | 427 | 162 | 22 | 2.9% | 146 | 19.3% | 589 | 77.8% | 757 |
| Stringiness (melted cheese) | 21 | 56 | 208 | 313 | 158 | 77 | 10.2% | 208 | 27.5% | 471 | 62.3% | 756 |
| Fineness | 15 | 11 | 144 | 390 | 196 | 26 | 3.4% | 144 | 19.0% | 586 | 77.5% | 756 |

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree
Chi-square= 1897.616; d.f.= 20; p<0.001

Table 12. Subjects' agreements regarding the descriptors of cheese flavor.

| Descriptor | SD | D | N | A | SA | Reject | | Neutral | | Accept | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | SD+D | % | N | % | A+SA | % | |
| Cheese flavor | 14 | 18 | 127 | 444 | 154 | 32 | 4.2% | 127 | 16.8% | 598 | 79.0% | 757 |
| Saltiness | 31 | 109 | 308 | 267 | 39 | 140 | 18.6% | 308 | 40.8% | 306 | 40.6% | 754 |
| Dairy sourness | 67 | 231 | 292 | 138 | 26 | 298 | 39.5% | 292 | 38.7% | 164 | 21.8% | 754 |
| Creaminess | 58 | 244 | 271 | 153 | 28 | 302 | 40.1% | 271 | 35.9% | 181 | 24.0% | 754 |
| Buttery | 10 | 18 | 156 | 434 | 140 | 28 | 3.7% | 156 | 20.6% | 574 | 75.7% | 758 |
| Milky | 22 | 32 | 182 | 382 | 136 | 54 | 7.2% | 182 | 24.1% | 518 | 68.7% | 754 |
| Oily | 229 | 303 | 181 | 35 | 6 | 532 | 70.6% | 181 | 24.0% | 41 | 5.4% | 754 |
| Bitterness | 88 | 182 | 272 | 175 | 37 | 270 | 35.8% | 272 | 36.1% | 212 | 28.1% | 754 |
| Bitter and sour aftertaste | 220 | 300 | 180 | 50 | 5 | 520 | 68.9% | 180 | 23.8% | 55 | 7.3% | 755 |

SD= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree
Chi-square= 2706.372; d.f.= 16; p<0.001