

Some Characteristics of Chinese-style Meat Snack Foods

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SUMMARY: There are many items of traditional Chinese-style meat snack foods in Taiwan market. No much research work related to these kinds of products has been done. In order to understand their characteristics product samples are collected from the local market. Water activity, moisture content, pH, TBA, VBN, amino acid nitrogen and bacterial counts are measured. pH of the products of beef and pork is at the range of 5.4-6.5 which is termed as low acid food. And most of samples have low moisture and water activity. The bacterial counts for all products are also very low. TBA, amino acid nitrogen and VBN for all samples which are collected from the local market are very low. Therefore, these types of chinese-style meat snack foods can be stored at the ambient temperature for a long period.

INTRODUCTION: There are at least several types of Chinese-style meat snack foods processed in Taiwan. Most of the traditional meat snack foods are processed by homemakers or small scale processors. The formulation, ingredients and forms of the products vary with the processors and localities. Most of these types of foods are lower water activity and higher level of sugar contents, spices, soy sauce as well as special heat-drying technology. They are very suitable for subtropical or tropical countries. Average life of the traditional meat snack foods stored at ambient temperature is about two months or longer. Their pH of 5.8-6.2 is relatively high, but is widely influenced by the amount of soy sauce and the high drying temperature, select heat-resistant and water activity tolerant microorganisms which the become important components of residual flora. No much research work related to the traditional meat snack foods has been done in Taiwan, exceptionally the papers published by our lab (Chen and Ockerman, 1986; Chen et al., 1987) and Lin and Chang (1987). In order to understand their characteristics, the samples were collected from local market for analysis. Moisture, water activity, pH, acid value, TBA value and volatile basic nitrogen as well as microbial counts were measured.

MATERIALS and METHODS: Samples are collected from the local market. Most products are bought from one of the chain store operated by the famous processors of meat snack food.

Chemical compositions are determined according to the methods of A.O.A.C. (1984). Crude fat is determined by ether extract, crude protein is determined by Kjeldahl method. Free fatty acid is determined by the method of titration method.

Thiobarbituric acid value (TBA) is measured with colorimetry which described by Ockerman (1974). Volatile basic nitrogen is determined by a modified method of A.O.A.C. (1984). And amino acid nitrogen is determined by the Sorensen method of A. O. A. C (1984).

Water activity is measured with Rotronic Hygroskopdt(Rotronic ag, CH-8040 Zürich, Swiss).

Total plate counts, and anaerobic bacterial counts are measured by the methods of FDA (1976).

RESULTS and DISCUSSION: Table 1 is a list of the traditional Chinese-style meat snack foods produced in Taiwan. All the products are processed with beef or pork, only few products are made of fish or poultry meat. Most of poultry products are marinated foods such as chicken or duck feet, gizzard, necks and wings. In this study it is confined in beef and pork items. They can be categorized into dry type, semidry type, sweet type, salty type and spicy type etc. Texture, taste and flavor of the products vary from usage of salt, sugar and other non-meat ingredients and formulation. In general, lower pH and water activity, higher salt and sugar usage. Therefore, they can be stored long period in ambient temperature.

Table 2 & 3 shows that levels of pH, A_w and moisture of the traditional meat snack foods collected from the local market in Taiwan. From the results of analysis, pH of the products is at the range of 5.4 to 6.5 which belong to low acid food. Some are located in acid foods. A_w of the products is at the range of 0.2 to 0.8. The result showed all the products in spite of beef or pork are very low moisture and low A_w . These may the reason why the products can be stored longer in the ambient temperature. Some products are very dried and hard, so humectants such as sorbitol, polydextrose and manitol are used to prevent hardening by higher temperature drying.

Table 4 & 5 show that levels of amino acid nitrogen content, volatile basic nitrogen, TBA value and acid value. The result showed the protein and fat were very stable under storage at the ambient temperature condition.

Table 6 & 7 show that the microbial counts. Total plate counts for beef and pork products were from \log_{10} 0.6 to 4.2, anaerobic counts and aerobic plate counts are very low, log number of bacterial counts are 0.0 to 6.8 and 2.0 to 5.5, respectively.

The microorganisms present in/on the products may be due to post contamination during handling since they are processed by using higher temperature to cook and dehydrate or the heat-resistant spores germination. All products pictures will be showed on post.

Minimum A_w for growth of some selected organisms are 0.86 for staphylococcus aureus, 0.62 to 0.65 for yeast and 0.62 to 0.65 for the molds, so most organisms can not grow on the Chinese-style meat snack foods which were investigated by our lab (Litchfield, 1976).

From this study, we would like to recommend these products and their processing methods can be extended and introduced to the tropical and subtropical areas.

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Table 1. A list of Chinese-style meat snack foods produced in Taiwan

Beef products
Beef jerky(Neu-zou gang)
Beef jerky with juice concentrate (Gootzu neu-zou gang)
Roasted beef jerky (Kao neu-zou gang)
Dried beef cubes (Neu-zou jao)
Pork products
Pork jerky (Tsu-zou gang)
Dried pork strips or slips (Tsu-zou tyao)
Dried pork cubes (Tsu-zou jao)
Dried shred pork (Zou-song)
Fried & shred pork (Zou-su)

* Neu-zou=beef, Tsu-zou=pork

** Gang=dried material

*** Jao=cubes

Table 2. pH, moisture and water activity of Chinese-style meat snack of pork

Items	pH	moisture	water activity
Pork jerky	5.90-6.48	14.03-25.98	0.66-0.79
Dried pork strips	5.59-6.16	19.19-25.49	0.67-0.80
Dried pork cubes	6.15-6.41	20.11-22.93	0.78-0.82
Dried shred pork	5.38-6.02	5.53- 9.01	0.23-0.63
Fried & shred pork	5.62-6.18	0.50- 4.91	0.20-0.27

Table 3. pH, moisture and water activity of Chinese-style meat snack of beef

Items	pH	moisture	water activity
Beef jerky	5.73-6.10	23.6-30.22	0.71-0.84
Beef jerky with juice concentrate	5.44-5.66	22.52-26.04	0.75-0.76
Roast beef jerky	5.52-5.90	21.94	0.67
Dried beef cubes	5.97-6.14	18.60-19.94	0.67-0.71

Table 4. Amino acid nitrogen, (AAN) VBN, acid value (AV) and TBA of pork snack foods

Items	AAN(mg/100g)	VBN(mg%)	AV	TBA
Pork jerky	6.05-6.84	3.24-5.89	1.54-2.62	0.04-0.18
Dried pork strips	4.21-7.63	3.37-8.39	1.54-2.52	0.05-0.31
Dried pork cubes	5.79-6.31	3.63-4.91	1.08-2.15	0.05-0.23
Dried shred pork	3.68-5.13	4.71-5.69	0.93-2.15	0.01-0.11
Fried & shred prok	1.05-3.95	1.86-4.32	1.08-1.31	0.02-0.15

Table 5. Amino acid nitrogen, (AAN) VBN, acid value (AV) and TBA of beef snack foods

Items	AAN(mg/100g)	VBN(mg%)	AV	TBA
Beef jerky	5.13-5.52	1.77-5.30	1.36-8.63	0.09-0.14
Beef jerky with juice concentrate	3.95-4.21	3.83-6.92	1.64-2.24	0.04-0.22
Roasted beef jerky	9.73	7.63-8.83	1.64-1.78	0.04-0.20
Dried beef cubes	4.21-4.76	6.38-6.87	1.50-1.54	0.04-0.09

Table 6. Log₁₀ number of bacteria per gram of Chinese-style meat snack foods of pork

Items	Total plate counts	Aerobic bacterial counts	Anaerobic bacterial counts
Pork jerky	0.6-5.26	2.0-5.47	3.62-5.27
Dried pork strips	2.30-4.16	3.31-5.59	3.71-6.83
Dried pork cubes	2.47-4.16	2.54-4.02	2.30-3.74
Dried shred pork	2.65-4.98	2.30-4.88	2.00-4.78
Fried & shred pork	2.54-4.36	2.00-3.53	2.00-3.27

Table 7. Log₁₀ number of bacteria per gram of Chinese-style meat snack foods of pork

Items	Total plate counts	Aerobic bacterial counts	Anaerobic bacterial counts
Beef jerky	2.17-3.88	2.00-5.47	2.00-3.74
Beef jerky with concentrate	2.00-2.54	0.00-2.17	0.00-2.17
Roast beef jerky	2.60-3.02	2.47-3.57	3.47-4.64
Dried beef cubes	2.00-3.27	2.17-3.98	2.20-3.27