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Analysis on Microbial Contamination of Several Kinds of Food in L City

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Abstract. Objective: through the statistical analysis and research of microbial detection data of several kinds of food in L city from 2015 to 2017, some industries and food with high risk of microbial contamination were paid attention to and monitored with emphasis, so as to provide a basis for taking effective measures to reduce the risk of food microorganism contamination. Methods: the national food safety standard GB4789 was used to conduct microbial project test for 12 kinds of food from 2015 to 2017. The test results were statistically analyzed for the analysis of microbial contamination in food. Results: from 2015 to 2017, a total of 2996 samples of 12 types of food were tested, with 2,697 of them qualified, and the total qualified rate was 90.02%. The total qualified rate difference in 2015 and 2017, 2016 and 2017 is statistically significant ($P < 0.01$). Among different types of food, candy and fermented wine had the highest qualified rate of 100%, while soy products had the lowest qualified rate of 55.97%. The qualified rate difference of food microorganism in different seasons and different packaging was statistically significant ($P < 0.01$), the qualified rate of bulk food was the lowest in summer. Conclusion: the overall situation of food microorganism contamination in L city is good, and the contamination situation of different food and seasons is different. In the summer, the microbial contamination of soybean products and bulk food is quite serious, which is improved in 2017 compared with 2015 and 2016. In the future, health supervision and management of summer soybean products and bulk food should be strengthened. "Food is the paramount necessity of people, cleanness is the paramount necessity of food", Food safety is a matter of vital importance to the national economy and people's livelihood. With the continuous progress of economic society and the diversification of people's diet culture, food safety has become the focus of attention of the government and consumers. Food pollution and foodborne diseases are still widespread all over the world, the situation of food safety is not optimistic, and public health faces many new challenges. Statistics show that microbial contamination is still the most important factor among many factors affecting food safety in China. Microbial contamination has become the main culprit affecting food safety in China [1]. In order to understand the contamination status of food microorganism in L city, the detection status of several kinds of food microorganism from 2015 to 2017 was analyzed.

Key words: Food, Microbial contamination, qualified rate.

MATERIALS AND METHODS

Sample Source

From 2015 to 2017, a total of 2,996 samples were received, mainly including quick-frozen food, cooked meat products, fermented wine, milk and dairy products, pastries, soy products, frozen beverages, beverages, condiments, drinking water, convenience food and confectionery products in 12 categories. Among them, 1390 samples were sampled and 1,606 samples were entrusted. The samples inspected come from various production enterprises, supermarkets, markets, hotels and restaurants, pastry processing workshops and so on in L city.

Methods

Test methods for total colonies, coliform colonies, pathogenic bacteria, fungi and yeast are operated in accordance with the latest national standard “National standard microbiological test for food safety” [2].

Evaluation Basis

According to the “compilation of national standards for food hygiene” [3] and the national standards for food safety, any indicator that does not meet the standards will be judged as unqualified samples.

Statistical Methods

The statistical software SPSS19.0, chi-square and multtest test.

RESULTS

Test Results of Different Kinds of Food Microorganism

From 2015 to 2017, a total of 2 996 pieces of 12 types of food were tested, among which 2 697 were qualified and the qualified rate was 90.02%. The highest qualified rate was 100 percent for fermented wine and sweets, and the lowest for soy products, only 55.97 percent. The qualified rate for frozen beverages, quick-frozen food and drinking water were all below 86 percent qualified. See table 1.

TABLE 1. The test results of various food microorganism from 2015 to 2017

Food type	2015			2016			2017			Total		
	Sample	Qualified	Qualified rate	Sample	Qualified	Qualified rate	Sample	Qualified	Qualified rate	Sample	Qualified	Qualified rate
Quick-frozen food	106	81	76.42	98	78	79.59	112	108	96.43	316	267	84.49
Cooked meat product	85	71	83.53	92	81	88.04	108	95	87.96	285	247	86.67
Fermented wine	112	112	100	105	105	100	75	75	100	292	292	100
Milk and dairy product	163	147	90.18	154	146	94.8	178	170	95.5	495	463	93.54
Pastry	58	53	91.38	62	59	95.16	87	83	95.4	207	195	94.2
Soy product	46	26	56.52	50	26	52	63	37	58.73	159	89	55.97
Frozen beverage	39	34	87.18	32	25	78.13	44	38	86.36	115	97	84.35
Beverage	86	83	96.51	102	99	97.06	134	132	98.51	322	314	97.52
Condiment	49	45	91.81	62	53	85.48	66	60	92.42	177	158	89.26
Drinking water	75	60	80	63	55	87.3	89	80	89.89	227	195	85.9
Convenience food	46	39	84.78	98	89	90.82	77	72	90.91	221	200	90.5
Candy	39	39	100	75	75	100	66	66	100	180	180	100
Total	904	790	87.39	993	891	89.73	1099	1016	92.45	2996	2697	90.02

Test Results of Food Microorganism in Different Years

From 2015 to 2017, the qualified rate of all kinds of food microorganism testing was compared. The qualified rate of three years was 87.39%, 89.73% and 92.45% respectively. By statistical analysis, the overall qualified rate was not statistically significant during 2015 and 2016. The difference between 2015 and 2017, 2016 and 2017 was statistically significant ($PLT < 0.01$) and the qualified rate of 2017 was higher than that of 2015 and 2016.

Test Results of Food Microorganism in Different Seasons

The qualified rate of 2996 micororganism samples from four seasons between 2015 and 2017 was compared, and the difference in the qualified rate between each season was statistically significant ($P < 0.01$). The qualified rate of the samples tested in winter was the highest, at 97.10%, and that of the samples tested in summer was the lowest, at 80.06%. See table 2.

TABLE 2. Food mircoorganism qualified rate in different seansons

Season	Sample	Qualified	Qualified rate (%)
Spring	678	650	95.87
Summer	863	691	80.06
Autumn	799	719	89.99
Winter	656	637	97.1
Total	2996	2697	90.02

Test Results of Food Microorganism In Different Packaging

In the sample types tested, there's a statistical significance to the qualified rate difference between pre-packaged food and bulk food microorganism ($P < 0.01$), and the qualified rate of pre-packaged food was significantly higher than that of bulk food. See table 3.

TABLE 3. Microorganism qualified rate of pre-packaged food and bulk food

Food type	Sample	Qualified	Qualified rate (%)
Pre-packaged food	2431	2340	96.26
Bulk food	565	357	63.19
Total	2996	2697	90.02

DISCUSSION

The microbiological test results of several types of food from 2015 to 2017 indicate that most of the food microbiological indicators closely related to people's life in L city can meet the requirements of hygienic standards and the overall condition is good. This indicates that with the implementation of the "food safety law" and the improvement of the food market access system, food producers have gradually strengthened their awareness of food safety, which can positively improve the health status and process management of the production environment. At the same time, the intensification of sampling inspection by the food supervision and administration department, the intensification of supervision measures and the intensification of the management of production licenses have all contributed to the improvement of food hygiene and safety every year. However, the qualified rate of food is affected by many factors, among which, the improvement of producer health status is one of them. Meanwhile, it is also affected by many factors, such as sample type, source, inspection items [4] and judgment standards. In recent years, the food safety standards have been constantly updated, and the microbial indicators have been changed, especially the standards of quick-frozen rice food GB19295-2016, which have greatly changed the requirements for product microbial indicators.

The qualified rate of quick-frozen food in 2017 is much higher than that in 2015. Therefore, in addition to the improvement of production conditions and the improvement of food safety awareness in food production enterprises, the updating and modification of the standards will also have a great impact on the qualified rate of food.

It can also be seen from the above data that the microbial contamination status of different food types and packaging forms is different. Among different food types, fermented wine and confectionery products have the highest qualified rate and soy products have the lowest qualified rate, which has a great relationship with the nature of products. Fermented wine and confectionery products have a certain alcoholic strength and a high sugar degree, which is not conducive to the growth and reproduction of microorganisms. The qualified rate of bulk food is obviously lower than that of prepackaged food. Bulk food manufacturers are mostly small workshops and roadside stalls, and the processing facilities are simple, the environmental hygiene conditions are not up to standard, and the finished products are not effectively protected in the transportation and sales process, so the qualified rate of microbiological indicators is low. Among the soy products, there are a lot of bulk foods, and therefore the qualified rate of its microbiological indicators is the lowest among all types of food products.

It can be seen from the test results of three years and different seasons that the microbial contamination of food in summer is serious. This is mainly because the bulk food are in high temperature in summer, and the protection is not in place to cause the microorganism to exceed the standard. The package of pre-packaged food is in good condition and within the warranty period. Its microbiological indicators are not affected by seasonal change. Therefore, when buying bulk food in the summer, it is better to eat it after heating, and we should also pay attention to the preservation conditions, so as to prevent the proliferation of microorganisms and the deterioration of food.

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