International Journal of Medicine and Life Sciences
ISSN: 2518-0223, Volume 3, Issue 2, December, 2018

Establishment and Application of Food Security Measurement System under the Influence of Transgenic Technology

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Abstract: Food is the most important thing to improve and ensure people's livelihood, and is an important strategic commodity related to the national economy and people's livelihood. Food security is directly related to the realization of the grand goal of building a well-off society in an all-round way and social stability and harmony, so the food security measurement system is established and applied under the influence of genetically modified technology. Food security measurement system module and workflow needed to be design to establish food security measurement system, and then through the experiment, food security measure system be applied. The results show that when compared the food security measurement system under the influence of transgenic technology with traditional food security measurement system, food security data analysis is significantly greater and the accuracy of food security measurement is also much higher.

Keywords: Transgenic Technology; Food security; Measurement system

1. Introduction

In recent years, China has basically achieved the balance of food supply and demand, but from the overall situation and in the long run, China still has some problems in food security [1]. To solve the problem of food security, it is mainly that we should improve the food quality continuously, eliminate the local food insecurity caused by poverty, improve the ability to obtain food, and achieve sustainable food security that is commensurate with people's income level and the overall level of economic development [2]. At the same time, the emergence of food surplus risk is also one aspect of current food problems in China [3]. Only finding out the causes of food insecurity and measuring food security can food security be truly solved [4]. Food security is an extremely complex problem, so it is difficult to use a certain index to fully measure the food security problem [5]. People are constantly exploring more effective and scientific food security measurement methods, but so far there are no unified international food security measurement methods. At present, income index, property index, malnutrition index, poverty index, food consumption and other indexes are used as measuring index to measure food security [6]. Some people inspect the behavioral responses and frequency of specific populations in situations of food scarcity to measure whether the food is security or not [7]. There are various reasons generating food security problems. The two basic reasons are the inadequate capability of national food acquisition at the macro level and the lack of individual and family food acquisition ability caused by poverty at the micro level [8]. Therefore, the measurement of food security can be carried out from the macro and micro perspectives. Setting the measurement indexes for food security issues from different levels can measure food security situation more comprehensively. At present, with the rapid development of transgenic technology, the food security problem is more noticeable, and therefore under the influence of transgenic technology, the measurement system of food security is constructed and applied.

2. Establishment of Food Security Measurement System

When establishing food security measurement system under the influence of transgenic technology, the first is to make level division of food security clearly, it is shown in Figure 1.

Food security measurement is to predict and evaluate food security situation in the future, so that relevant departments of food security can timely take short-term and long-term countermeasures, so as to defuse and prevent food insecurity risks. The basic function of food security measurement system under the influence of transgenic technology is to measure the situation of food security and give warning and forecast of food security problems in advance. The basic workflow of food security measurement system under the influence of gm technology is shown in Figure 2.

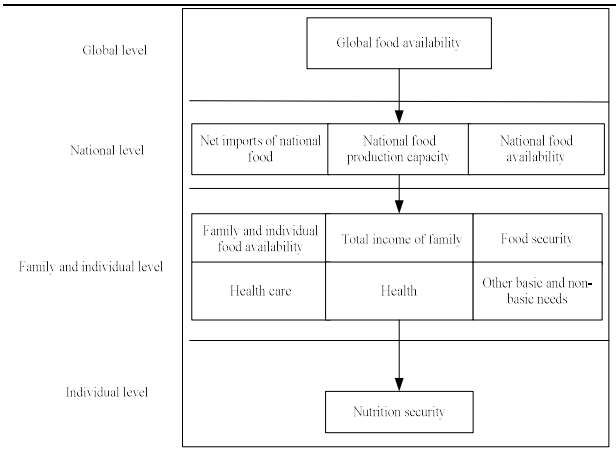

Figure 1. Level division of food security

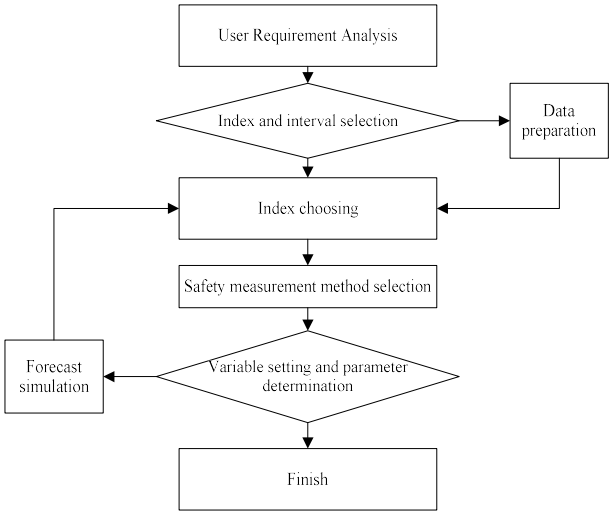

Figure 2. Basic workflow of food security measurement system

Food security measurement system under the influence of transgenic technology mainly includes database module, forecast simulation module, warning signal forecast module and security measurement module. When measuring food security, the main measuring indexes are self-sufficiency rate of rations and food price fluctuation rate. Of which, the safe weight of rations self-sufficiency rate is 0.05, and standard value is 100, suppose the actual influence coefficient of ration self-sufficiency rate on food security be A, then

$$A = 0.05 \times \frac{C_t}{100\%} \quad (1)$$

Of which Ct represents the actual value of ration self-sufficiency rate in the t year.

The safe weight of food price fluctuation rate is 0.05, and standard value is 4, suppose the actual influence coefficient of food price fluctuation rate on food security be B, then

$$B = 0.05 \times \left(1 \pm \frac{D_t - 4}{4}\right) \quad (2)$$

Of which Dt represents the actual value of food price fluctuation rate.

Database module in food security measurement system under the influence of transgenic technology consists of a series of data closely related to dietary energy and balance of food supply and demand, such as food price, reserve, import and export, demand, food production and other aspects of index data. In addition, the database module also includes index data related to the level of fairness in residents' income distribution and national food distribution capacity.

Forecast simulation module is used to predict the precursor indexes related to food security, and the trend of precursor index related to food security indicates the trend of food security development. The precursor indexes related to food supply include agricultural sci-technology personnel growth rate, agricultural sci-technology input, the proportion of financial support for agriculture, food purchasing price index, net yield of food cost per mu, coefficient of damage area, agricultural film sales growth rate in the first quarter, pesticide sales growth rate in the first quarter, fertilizer sales growth rate in the fourth quarter, the growth rate of draught livestock ownership at the end of the year, growth rate of total power of farm machinery, good grain seed coverage, growth rate of effective irrigation area, change rate of grain sown area, fertilizer price index and so on. The precursor indexes related to food demand include the number of pigs, cattle and sheep in stock increased and the growth rate at the end of the year, growth rate of output value of food industry, growth rate of per capita income, growth rate of urban population, and the growth rate of population and so on.

Warning signal forecast module is to measure the safety of each warning index and make warning prediction. These warning indexes include balance situation of food and dietary energy supply and demand index, fluctuation index of food production（namely grain and food production status index）, fluctuation index of food demand (namely grain and food demand status index), grain reserve demand ratio (namely grain and food safety reserve status index), dependency coefficient of grain international trade (grain and food import and export status index), food price rising rate (namely grain and food market price stability index), comprehensive index of food security (namely comprehensive measurement index of food security), complementary index reflecting food security including level of price differences between regions (namely index of national grain distribution capacity) and poverty population rate (namely residents income distribution and gap index).

Security measurement module in food security measurement system under the influence of transgenic technolo-

gy is the most important one. At present, the information degree of food security inspection business in China's food security inspection industry is still lower than that in other countries, so it needs to be further strengthened, and therefore the security measurement module in this system is mainly based on internet technology. Through the collection of big data of food security, food security inspection data is conducted in-depth analysis, thus to carry out safety measurement and guide related work. For example, we pay attention to using the feedback of risk monitoring results in circulation links to guide grain processing and circulation; We provide policy basis for the disposal of excessive grain and prevent grain with excessive pollution from entering the food market; Through risk monitoring and warning, we master the quality and hygienic condition of grain in the producing areas; Through quality investigation and measurement, we guide to adjust and optimize the structure of grain planting, link production with marketing, and increase supply ratio of high-quality food and so on.

3. Application of Food Security Measurement System

Now China's traditional food security measurement system has many problems that it is difficult to analyze regional grain quality and time trend and compare before and after, difficult to mine and analyze the information of food security data from food index, variety, region and other aspects, and the sharing, analysis and retrival rate of food security data is low, and food security inspection data is difficult to form a database, and information degree of the detection business of each food security monitoring institution is low, therefore, in order to prove the effectiveness of food security measurement system under the influence of transgenic technology and apply it, a simulation experiment is designed. In the process of experiment, the food security data of a certain area is taken as the experimental subject to measure food security in this region. In order to ensure the effectiveness of the experiment, the traditional food security measurement system is compared with the food security measurement system under the influence of transgenic technology to observe the result. The comparison between food security measurement accuracy rates under the two cases and data analysis quantity of food security are as shown in figure 3.

It can be seen from figure 3 that compared with those of traditional food security measurement system, under the influence of this transgenic technology, data analysis quantity of food security is significantly larger, the analysis speed is faster, the analysis efficiency is higher, and the accuracy of food security measurement is also higher.

4. Conclusions

Establishing a food security measurement system under the influence of transgenic technology can analyze and measure food security status from various aspects, making policy adjustments timely and forecasting food security information in advance, it is the best choice for realizing food security entirely.

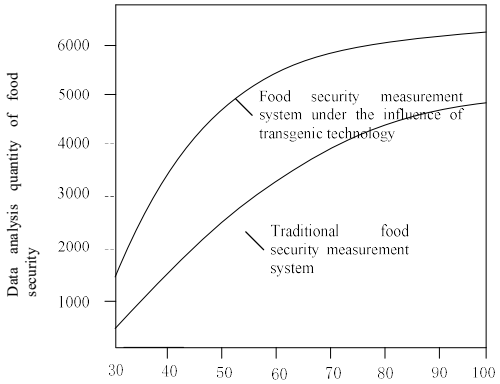

Figure 3. The comparison between food security measurement accuracy rates and data analysis quantity of food security

References

[1] Chen Jianpeng. The Present Situation of the Commercialization of Genetically Modified Crops and Its Influence on Food Security and the Enlightenment. Issues in Agricultural Economy. 2010, 313, 115-120.

[2] Liu Yunjun, Gu Zhiwei, Liu Yan. etc,. Establishment and Application of Large-Scale Transformation Systems for Maize. Scientia Agricultura Sinica. 2014, 47, 4172-4182.

[3] Liu Peilei, Zhao Yongguo, Li Ning. etc,. Impacts of Transgenic Technology on Food Security and Relevant Countermeasures. Journal of Agricultural Science and Technology. 2010, 12, 111-115.

[4] Li Bixia, Ding Qi, Li Caihui. Effects of transgenic technology on food security. Agricultural Disaster Research. 2013, 31, 261-263.

[5] Zhang Xijuan, Lai Yongcai, Meng Ying. Studies and Application Progress of Japonica Rice Transgenic Technology System. Heilongjiang Agricultural Sciences. 2017, 11, 136-139.

[6] Lei Chao. Public Perceptions on Genetic Modification Technologies in Relation to Food Safety—Take Xi'an City as an Example. Shaanxi Forest Science and Technology. 2016, 11, 276-282.

[7] Zhang Xin, Fu Yaping, Zhou Junli. etc,. Establishment and Application of Large-Scale Transformation Systems for Rice. Scientia Agricultura Sinica. 2014, 47, 4141-4154.

[8] Fu Zhengyan, Wang Ruibin, Tang Huacang. Literature Review on Food Security from the Perspective of Transgenic. Agricultural Economics, 2015, 12, 251-253.