Research Article
Study on Control Strategy of Food Borne Stimulant and Security Administration of Long Distance Runners Food

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Abstract: In order to improve the risk evaluation level of food borne stimulant for long distance runner, food borne stimulant is bad for long distance runner, it is necessary to take measurement to control the food borne stimulant and the corresponding food security system should be constructed for the long distance runner. Firstly, the basic characteristic of food borne stimulant is analyzed. Secondly, the controlling measurements of food borne stimulant are put forward from different aspects. Thirdly, the risk identification of food borne stimulant for long distance runner is studied. Finally, the risk evaluation model of food borne stimulant for long distance runner is constructed.

Keywords: Control strategy, food borne stimulant, food security system, long distance runner

INTRODUCTION

Food borne stimulant can bring out the serious negative effect for organization and personnel. In recent years, the stimulant problem not only relates to the medicine, but also relates to meat ware. The organizing committee of distance race concerns the food safety of long distance runner. It the long distance runner wrongly eat the certain foods, the positive for doping may happen. Because doping penalty carries out "strict liability", although the long distance runner takes the doping wrongly, if the checking result is positive, the penalty is necessary. The case relating with food borne stimulant often happens. It is necessary to take measurement to control the relating events (Kuley et al., 2013).

With increasingly fierce of distance race, the long distance runner not only carries out hard scientific training, but also applies scientific dietary management and safe nutrition supplement, the sports fatigue of long distance runner can be alleviated and the physical potential of long distance runner can be fully played, then the long distance runner can obtain good achievement (Özoğul et al., 2012). The long distance run sport belongs to speed endurance project and gives priority to aerobic metabolism. Thermal energy and all kinds of nutrition consumption is big, in the latter period of the match with high strength and long time, many long distance runners occurs the blood sugar decline phenomena and the vitamin, inorganic salt and moisture content of long distance runner can lose with sweat, then the metabolic balance can be damaged, the fatigue of never and muscle will happen (Toy et al., 2015). Therefore the food safety management of long distance runner should be concerned and the risk

evaluation model of food borne stimulant for long distance runner should be constructed, which can offer basis for establishing the corresponding measurements.

BASIC CHARACTERISTIC OF FOOD BORNE STIMULANT

Some food concludes naturally stimulant component, for example, coffee, tea, chocolate and other food and drink concludes caffeine, which is listed as illicit drug many times by international anti-doping organization and unleashed repeatedly. Generally the dropping in food is easy to be identified and controlled, the long distance runner can not eat these foods, while the source of poultry meat dish in doping is very complex (Flematti et al., 2011). Because the traditional feeding system of livestock can not satisfy the requirement of current society, the long period use of antibiotics and hormone drugs in all kinds of pesticides, veterinary drugs can lead to the residual in the animal derived food, these residual material can be transformed in the food chain, which can be the source of food borne stimulant. Unreasonable use of drug, malicious adding drug, adding artificially in Circulation and secondary pollution caused in the process of storage and transportation can bring out the difficult for controlling the dropping. In recent years, the inspection items of food banned substances conclude beta2 agonist, chemosynthetic Steroid, glueoeorticoid steroids and zeranol. In all kinds of food borne stimulant, lean meat powder is most difficult to be prevented. The lean meat powder concludes many kinds of β-dropping such as clenbuterol hydrochloride, ractopamine, salbutamol. At present clenbuterol is most the additive in food.

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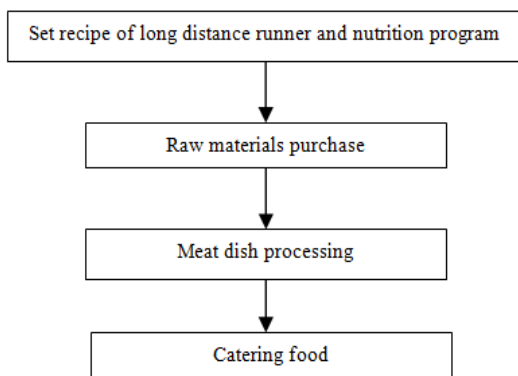
Fig. 1: Critical link diagram of meat dish processing

Controlling measurement of food borne stimulant: Key link control of meat dish processing: According to the controlling requirement of food borne stimulant for long distance runner, the meat dish processing in restaurant is analyzed, finally the four critical controlling links are chosen, the corresponding diagram is shown in Fig. 1.

When the recipe of long distance runner and nutrition program are set, the pollution meat dish can not be used. Because the metabolic residues regularity of Clenbuterol in different tissue of animal is different, the residues in eye and internal organs are highest. In order to ensure the safety of long distance runner, many sport management departments demand the long distance runner eat less pork, beef and mutton, the risk of dropping caused by food pollution can be reduced. Diet diversification can be used in compound food, the shellfish, fish and poultry food can be added properly, then the dietary quality requirement of long distance runner can be ensured. Purchase should be grasped strictly in the procurement of raw materials, supplier should be selected tightly, fixed procurement should be imposed and meat ware checking should be controlled effectively. The critical limit of food borne stimulant should satisfy the requirement of long distance runner to safe pork, the super trace detection technology should be carried out in professional laboratory. In recent years the effective inspection methods conclude gas chromatography-mass spectrometry, liquid chromatography-mass spectrometry methods, which have higher correctness (Moraga *et al.*, 2011).

In meat dish processing the blanch operation can be added in the processing part, team leader can think more about cooking boiled meat and frying meat, the chili ingredients can be added in the food moderately, then the consumption of porridge can decrease, the risk of Clenbuterol positive can be reduced. The total of clenbuterol hydrochloride can not overpass 1μg for pork products with single food, then the positive doping test can not be obtained. The dining room of long distance runner should control strictly the single food, especially control the disposable intake of livestock meat that could be contaminated and ensure the food diversification, then the over proof of clenbuterol hydrochloride for excess of contaminated food can be avoided.

Construct the food safety management system of long distance runner: Because of the limited conditions of detection technology, detection period and detection cost, the frequency of inspection for meat ware is relative low. While the food detection of meat ware is carried out at the same time, strengthening diet management of long distance runner and constructing the food safe supplying mechanism can be an important part of quality management. The international standards ISO9001, HACCP and ISO22000 applied in the food industry can be applied in solving the food security problem of long distance runner (Ni *et al.*, 2014).

Food safe management procedure of long distance runner: Every step in processing technology procedure of long distance athlete meals can be viewed as controlling point, the hazard analysis is carried out for every controlling point, then the critical controlling point can be found out, then the controlling standard can be constructed, then the controlling measurements and rectification program can be confirmed and the whole record is made finally (Huang *et al.*, 2013).

In order to ensure the food safety of long distance runner for every part in the procession of food processing, for the abstract step of every part in the product activity of dinning room of long distance runner, the hazard analysis can be carried out from aspect of Biological, chemical and physical and the critical controlling point is confirmed, then the working sheet of hazard analysis for long distance runner meal processing is obtained. The working sheet of raw material purchase, warehousing storage chopper, rough finish, cooking, container disinfection, separately eat by dishes sale should be made. The working sheet of raw material purchase is shown in Table 1.

Table 1: Hazard analysis working sheet of long distance runner meat processing (raw material purchase)

Processing procedure	Potential hazard	Whether the harm is significant or not	Controlling measurement	CCP Yes/No
Raw material purchase	Pathogenic bacteria, parasite	Yes	Sentinel procurement, certificate verification for every batch, do not purchase the animal intestine, control the accepting temperature strictly for meat ware, egg, fish and other raw material and purchase the green vegetable	Yes
	Food borne stimulant, drug residues	Yes		
	Foreign matter	No		

Table 2: HACCP plan

Ccp	Obvious hazard	Critical limited value	Monitor			
			Object	Method	Frequency	Personnel
Raw material purchase	Clenbuterol residue	Exist/ nonsexist (clenbuterol<0..05ng/g) Positive/negative	Meat ware fruit Vegetable	Detection in lab	Every branch	Purchasing agent, warehouse keeper
Corrective action	Record		Confirmation			
Reject accept	Purchase record, unqualified food of long distance runner processing sheet, registration table		Check every record and observe the suppler every year, carry out drug residue inspection for meat ware and vegetable			

According to the national, industrical and inner standards, the limited value of critical controlling point is confirmed and the monitoring measurement and corrective action are taken and the complete records are saved, then the HACCP plan table can be generated, which is shown in Table 2.

For the monitoring and corrective action, the purchase should be grasped strictly, in addition, the traceability management is also be implemented. The whole traceability system of food for long distance runner has "trace to the source" and "tail after" functions. Through communicate with breeding base fully the scientific guidance is carried out, the dynamical monitor of doping substances is carried out in advance and the monitor of drug holiday is also carried out, the record is saved and the whole database is constructed. At same time the sample reference system of meat ware is established in the restaurant of long distance runner. Once the positive sample is found out, the sudden food safety event contingency plan begins immediately, the source of food can be found out according to the food traceability system (Chen, 2014).

Risk identification of food borne stimulant for long distance runner: In the food supply chain from farm to dining-table food may exist many kinds of hazards. The raw material of food has the following hazards: animal food raw material may exist residues of veterinary drugs, peanuts and milk may conclude allergic substances, aquatic products, fruits, vegetables may conclude pesticide residue, parasite and its egg. The pollution of pathogenic bacteria can be exist in the food processing ands stored procedures, such as, cold processing catering and Fast food box lunch. These hazards may exist and develop in a certain condition, which can bring out food safety event, such as Food poisoning, food borne stimulants food allergy and food borne parasitic diseases. In the long race period, the society factor, natural factor, management factor, consumption factor and feeding way may lead to risk increasing of food safety event for long distance runner (Yu, 2015).

Risk evaluation model of food borne stimulant for long distance runner: In order to evaluate the risk of food borne stimulant for long distance runner effectively, the grey system theory is applied in it and

the evaluation index system is established, then the optimal index collection is confirmed and the index weight is obtained, when data is confirmed, the evaluation of the risk of food borne stimulant can be carried out according the following theoretical model (Yang and Zhuang, 2013):

$$V = E \times W \tag{1}$$

where, V is comprehensive access result vector of the m subjects evaluated, $V = [v_1, v_2, \cdots, v_m]^T$ and the series of risk of food borne stimulant for long distance runner can be carried out based on the value of V; W is the weight vector of n indexes, $W = [w_1, w_2, \cdots, w_m]^T$ and the following expression is satisfied: $\sum_{i=1}^{n} w_i = 1$. E is the evaluating matrix for evaluation index, which is be expressed as follows:

$$E = \begin{bmatrix} e_1(1) & e_1(2) & \cdots & e_1(n) \\ e_2(1) & e_2(2) & \cdots & e_2(n) \\ \vdots & \vdots & & \vdots \\ e_m(1) & e_m(2) & \cdots & e_m(n) \end{bmatrix} \tag{2}$$

where, $e_i(k)$ is relational coefficient between k th index and k th optimal index for i th subject evaluated, which is expressed as follows (Wang *et al.*, 2013):

$$e_i(k) = \frac{\min_i \min_k |C_k^* - C_k^i| + \lambda \max_i \max_k |C_k^* - C_k^i|}{|C_k^* - C_k^i| + \lambda \max_i \max_k |C_k^* - C_k^i|} \tag{3}$$

where, λ is the resolution ratio, $\lambda = 0.5$, C_k^* is the optimal result of k th index of i th evaluation object.

The grey system theory concludes a lot of kinds of evaluation methods based on the feature of the different problems. Based on the performance of the evaluation of the risk of food borne stimulant for long distance runner, the grey relational analysis is applied in this research. The corresponding analysis procedure is shown as follows:

Step 1: Confirm the series of data: The reference sequence is defined by S_0 and the comparing data series are defined by S_i ($i = 1,2,\ldots,5$). First,

the evaluating value of the first level index in main rule layer is calculated, which can be used as original index value of the objective layer and the evaluating value of the audit risk of high education is calculated and the sequence of the audit risk of high education can be controlled according to the sequence of the evaluating value. For the index "natural risk", the following sequence collection can be obtained:

$$X = \{X_0, X_1, X_2, X_3\} \tag{4}$$

where,
X_0 = Outer environment sequence
X_1 = Business nature sequence of the enterprise audited
X_2 = Financial condition sequence of the enterprise audited
X_3 = Management status sequence of the enterprise audited

For the index "significant misstatement *r*isk", the index sequence collection can be expressed as follows:

$$X = \{X_0, X_1, X_2, X_3, X_4, X_5\} \tag{5}$$

where,
X_0 = The soundness risk sequence of relating rules
X_1 = The Macroeconomics environment sequence
X_2 = Policy risk sequence
X_3 = Cooperation risk sequence
X_4 = Leaking sequence of the important information
X_5 = Morality risk sequence

For the index "checking risk", the index sequence collection can be expressed as follows:

$$X = \{X_0, X_1, X_2, X_3\} \tag{6}$$

where,
X_0 = The professional level sequence of the auditor
X_1 = Standardization sequence of operation of the auditor
X_2 = Rationality sequence of audit procedure
X_3 = The fault sequence of the auditor

Step 2: Compute the relational coefficient: The relational coefficient for all evaluation indexes can be calculated based on formulation mentioned above.

Step 3: Compute the relational degree: The relational degree can be calculated by the following expression:

$$r_i = \frac{1}{m} \sum_{k=1}^{m} e_i(k) \tag{7}$$

The relational degree of all the evaluation indexes can be computed.

Step 4: Compute the weight measure: The weight measure can be computed based on the following expression (You and Li, 2013):

$$\omega_i = \frac{r_i}{\sum_{i=1}^{m} r_i} \tag{8}$$

The relative weight measure of all evaluating indexes can be calculated.

Step 5: Compute the index evaluating value in main rule layer: The simpler the business is, the better the financial status and the management is and the less the natural risk is, therefore the evaluation value of the natural risk can be calculated, which can be got by the following equation for the index "natural risk":

$$V_e = C_0 * \omega_0 + C_1 * \omega_1 + C_2 * \omega_2 + C_3 * \omega_3 \tag{9}$$

The evaluating value of the index "significant misstatement *r*isk" and "checking risk" can also be obtained.

Step 6: Compute the evaluating value of the risk of food borne stimulant for long distance runner: The three index series "natural risk, significant misstatement *r*isk, checking risk" is established based on the following expression:

$$X = \{X_0.X_1, X_2\} \tag{10}$$

where, X_0 is the original data series, X_1 and X_2 are the comparing data series and then the relational degrees of the original data series and the comparing data series are be obtained and the relative weights ω_1' and ω_2' of each indexes of the natural and misstatement risk is obtained. The higher the evaluating value of the audit objects are, the better the risk degree of every index is and the lower the risk of food borne stimulant is. And the evaluating result of the risk of food borne stimulant for long distance runner is computed by the following expression:

$$V_{ar} = I_n * \omega_1' + I_c * \omega_2' \tag{11}$$

where,
I_n = The risk index of the natural risk
I_c = The index of the controlling risk

The risk evaluation model can be used to evaluate the risk level of food borne stimulant for long distance runner, the model is applied some cases, the risk level

of food borne stimulant for long distance runner can be obtained effectively.

CONCLUSION

The food borne stimulant is unfavorable for long distance runner, if the long distance runner eat the food with stimulant wrongly, they can not enter the match and the corresponding controlling measurement should be taken for avoiding the relating event. The food safety management system should be established for long distance runner, the monitoring measurement should be carried out for every part of food processing for long distance runner. And the advanced risk identification and evaluation model should be used for ensuring the food safety of long distance runner.

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