Aflatoxin contamination can occur at any point along a raw peanut supply chain beginning from farmers to consumers. Thus consumers have a high chance of getting this kind of toxin. Aflatoxin contamination in peanuts is an important problem to both health and economy. Therefore, this research is aimed to study the structure of raw peanut supply chain in Thailand, develope a peanut quality sorting manual for consumption purpose, and develope a model to predict the level of aflatoxin contamination in raw peanut. The stucture of raw peanut supply chain in Thailand was a network of farmers, collectors or shelling plants, food industries, distributors, wholesalers, retailers, users, and consumers. Peanut sorting process was done by distributing peanuts on a pale color surface, separating foreign matters such as rock, soil and shells from peanuts, and then removing defected kernels. Defected peanut kernels included shriveled, damaged either by insect or machine, imperfect skin, discolored, irregular shaped, germinated and moldy kernels. Last group from the sorting process was peanuts with normal appearance, which could be processed into consumer products. The developed sorting procedure was applied to peanut sampled from retailers in Bangkok (44 districts) to study its efficiency. MATLAB 6.5 program was used as a tool to determine a fitted distribution of aflatoxin level. This fitted distribution was used to find the probability of having aflatoxin level more than 20 ppb. The results showed that sorting peanut according to the developed procedure could reduce the chance of aflatoxin contamination more than 20 ppb in raw peanut from 64.10% to 36.57%. Structure of the developed artificial neural network for prediction of aflatoxin level in raw peanut was a network with Levenberg-Marquardt training function, Log-Sigmoid Function for the transfer function in the first layer, and Linear Function for the transfer function in the second layer. This network composed of one hidden layer with 15 neurons. Input variables to the network were the ratio of weight of peanut with normal appearance to weight of peanut with risk of aflatoxin contamination, average of moisture content of peanut before sorting, color of peanut with normal appearance (L*, a*, b*), average of maximun temperature, minimum temperature, average temperature and average relative humidity from one month ago. Output variable was a level of aflatoxin contamination in raw peanut (less than 20 ppb, and equal to or more than 20 ppb). Accuracy of aflatoxin contamination prediction for a training data set and test data set were 89.13% and 75%, respectively.

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