

# Studies on a New Canned Food Composed of Plants and Meat

LI HONG JUN, ZHANG RONG QIANG and HE SHI LONG

Department of Animal and Veterinary Science  
Southwest Agricultural University, China

## ABSTRACT

Processing of canned food product made from local plant and meat resources, according to the physicochemical and biological properties of the plant and minced meat, is the objective of this study. The studied product is a multiplex canned food. It is the first generation of a high grade, natural, nutritious canned food in China. It is rich in the nutritive composition and eatable fiber. Protein, fat, moisture, vitamin C, vitamin E, B-carotene and glucomannan were 12-15%, 15-20%, 50-55%, 1-5mg/100g, 8-10ug/g, 0.1-0.15mg/100g and 0.2-0.4g/100g, respectively. It contains many kinds of trace elements and eighteen kinds of amino acid, but it doesn't contain any preservatives and artificial synthetic pigments. It shows the special advantages of both animal and plant components.

Subject words: canned food, vegetable, pork, multiplex, nutrition, food fiber.

## SUMMARY

Studied product is a multiplex canned food. It is processing with the local plant resources and pork. The nutrients of the compound animal-plant canned food were determined. The sensory indices and sanitary indices of the canned food were evaluated in this paper. The results have been summarized in Table 2, 3, 4 and Table 5. The product possesses desirable color, flavor, taste and appearance, and it is easy to be digested and absorbed by the human body. It is the first generation of compound animal-plant canned food in China.

## INTRODUCTION

In the world today there has appeared a trend toward high-protein, low-fat, low-calorie, low-salt, health-promoting and multi-functional food. In the meantime, how to make food products without addition of any chemical medicines has become an important aspect in food production research. The development of modern compound food with vegetables and meat will meet the needs of the human body for various nutrients. The active components in vegetables may be conducive to the prevention of certain diseases as well as to the improvement of the nutritional value of the food owing to the dietary fiber (DF) in them. In the 1970s, Burkitt DP. (1972) found in his epidemiological study that many human diseases in the developed countries are associated with insufficient intake of DF. As far as we know, no information is available at

Present of research work on products in which meat and healthful vegetable are processed together and combined into one food product to realize a complementation of animal nutrients and plant nutrients. The present study was made to select the best natural raw food materials for canning of compound animal-plant food, to develop an original procedure of compound processing and to scientifically define the nutritive value indices, sensory criteria and sanitary requirements for the evaluation of such products. The development of such food products is considered to be the first attempt in China and to be of significance for the improvement of the dietary structure and the varification of the people in this country.

## MATERIALS AND METHODS

### 1.1 Experiment materials

#### 1.1.1 Principal raw materials

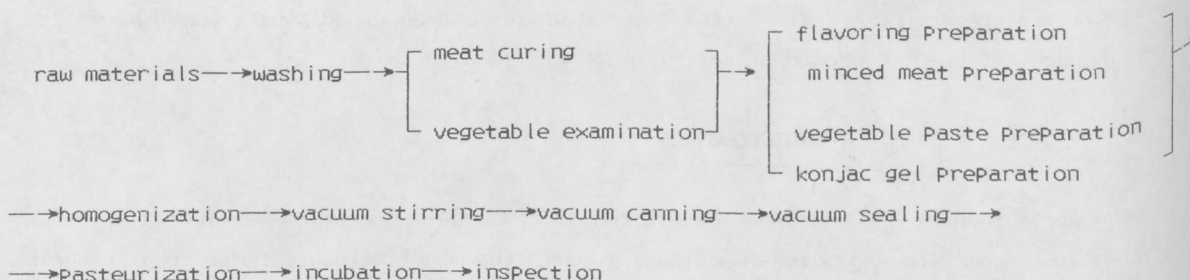
Fresh carrot, potato, soybean sprouts, red radish, tomato, mushroom, onion, mustard tubers, cauliflower, sweet potato and some others were obtained from the farmers' market and were adopted as experiment materials together with fresh pork. After removing the uneatable portions, all the materials were washed clean, chopped and crashed and made into vegetable paste and minced meat.

#### 1.1.2 Auxiliary materials

Ginger, pepper powder, table salt, sugar, green Chinese onion, deodorized soybean protein and refined konjac powder.

### 1.2 Procedure of the processing technology for compound canned animal-plant food

#### 1.2.1 A chart illustrating technologycal processes



#### 1.2.2 Main points in Processing

1.2.2.1 The ratio (w/w) of vegetable to meat must kept below 50%.

1.2.2.2 The ratio of fat to lean meat is 3:7 or 2.5:7.5 .

1.2.2.3 full homogenization must be achieved through chopping, mixing and vacuum stirring.

1.2.2.4 Conventional Pasteurization for meat is adopted.

1.2.2.5 Tin cans are used for package, the net weight of the cans being 100-397g.

### 1.3 Methods for Principal component analysis and sanitary inspection

#### 1.3.1 Component analysis

- 1.3.1.1 Protein, amino acids, fat, water, Fe, and Zn were determined in this study according to the national standard methods of P.R. of China (Chemical and physical sanitary inspection of food products).
- 1.3.1.2 DF was determined with the method described by Peng Bei Qing. Konjac mannan (Gluc-omannan) was determined with the method described by Li Qun Ying (1990).
- 1.3.1.3 B-carotene, vitamin C and vitamin E were determined with the procedure described by Wang Bing Dong (1989).
- 1.3.2 Sanitary inspection
- 1.3.2.1 Total bacteria number, approximate estimation of E. coli, and disease-causing bacteria in the products were determined according to the national standard methods of P.R. of China (Chemical and physical sanitary inspection of food products).
- 1.3.2.2 Pb, Cu and Zn, and sodium nitrite were determined according to the national standards of P.R. of China mentioned above.

## RESULTS AND DISCUSSION

- 2.1 Trials of selection for the optimum combination of vegetables and meat in canned food production
- The results of the trials are given in Table 1. The kind of vegetables and the amount of their supplementation had considerable effects on the color, flavor, taste and appearance of the resulting products and were directly related to the shaping of

Table 1 The effects of vegetables and the amount of their addition on the sensory indices of the canned food

vegetables	sensory indices	amount of addition (%)						(*) sensory scores
		10	20	30	40	50	60	
carrot	color	+++	+++	+++	+++	+++	+++	<del>4.5</del> 5.0
	flavor	++	+++	+++	++	+	-	
	taste	++	+++	++	+	+	-	
	appearance	+++	+++	++	+	-	-	
red radish	color	++	+++	++	+	+	-	4.0
	flavor	++	++	+	+	+	-	
	taste	+++	+++	+++	++	+	-	
	appearance	+++	++	++	+	-	-	
mushroom	color	+++	++	++	+	-	-	4.5
	flavor	++	+++	+++	+++	+	-	
	taste	++	+++	++	+	-	-	
	appearance	+++	+++	++	+	-	-	
soybean sprouts	color	+++	++	++	+	-	-	4.0
	flavor	++	+++	++	+	-	-	
	taste	++	+++	++	+	+	-	
	appearance	+++	++	+	-	-	-	
onion	color	+++	++	++	++	+	-	4.5
	flavor	++	+++	++	++	+	-	
	taste	+++	+++	+++	++	+	+	
	appearance	+++	+++	++	+	-	-	
potato	color	+++	++	++	+	-	-	4.5
	flavor	++	+++	+++	+++	++	+	
	taste	+++	+++	+++	++	++	++	
	appearance	+++	+++	+++	++	+	-	
mustard tuber	color	+++	++	++	+	-	-	3.0
	flavor	++	+++	+++	++	+	+	
	taste	++	++	++	+	+	-	
	appearance	+++	++	++	+	-	-	
cauliflower	color	+++	++	++	+	+	-	2.5
	flavor	+++	+++	++	+	+	-	
	taste	+++	++	+	+	+	-	
	appearance	+++	+	+	-	-	-	

The symbol("+++", "++", "+"and"--") in Tab.1 represent superior,good,satisfactory and poor,respectively.

the canned food.All the to kinds of vegetables studied could be well homogenized with the meat and give good shape to the products.Carrot and tomoto seemed to be the most desirable vegetable additives,giving the best color,flavor,taste and appearance to the products.The optimum addition ranged from 10% to 20%.The product that contained 15-20% of vegetable material obtained the highest scores in sensory evaluation.The product with sweet potato as an ingredient had poor shaping and flavor.

2.2 The nutritional element analysis of the canned compound carrot-Pork ——one of the series of animal-Plant material canned food products

The canned compoUND carrot-Pork proved to be rich in various amino acids and contain enough Protein,fat,B-carotene,vitamin E,Fe and Zn to meet the needs of the human body.In the meantime,it contains moderate amount of DF so that the animal and plant nutrients complement each other(Tab.2&3)

Table 2 Amino acids and their contents in the compound animal-Plant canned food

amino acids	aspartic acid	threonine	serine	glutamic acid	glycine	alanine	cysteine
content(%)	0.97	0.43	0.43	1.34	0.40	0.28	0.13
amino acids	valine	methionine	isoleucine	leucine	tyrosine	Phenylalanine	lysine
content(%)	0.40	0.37	0.43	0.72	0.46	0.36	0.76
amino acids	histodine	arginine	Proline				
content(%)	0.40	0.66	0.37				

Table 3 Nutrients in the compound animal-Plant canned food

nutrient,Protein	fat	moisture	Fe	Zn	vic.C	vit.E	B-carotene	glucomannan
(%)	(%)	(%)	(%)	(%)	(mg/100g)	(ug/100g)	(mg/100g)	(g/100g)
cotent,12.01	15.28	55.10	1.73×10 <sup>-3</sup>	1.5×10 <sup>-3</sup>	1.6	6.28	0.15	0.27

2.3 Sanitary evaluatoin of products

The sensory evaluation of the compoUND canned carrot-Pork showed that its color,flavor,taste and appearance changed to some extent in the course of storage(Tab.4). The sanitary inspection demonstrated that its quality is in agreement with the national sanitary standards of the People's Republic of China and is regarded as a safe,sanitary and nourishing food.

Table 4 Scores in sensory evaluation of the stored canned food

	storage duration (months)				
	0	6	12	18	24
color	5.0	5.0	5.0	4.5	4.5
flavor	4.5	4.5	4.5	4.5	4.0
taste	5.0	5.0	4.5	4.5	4.0
appearance	4.5	4.5	4.5	4.5	4.5



\*Sensory scores:Ten judges with a sharp nose and no parachromatism were selected.Having learned the product of sensory evaluation,each of them was given a can of luncheon pork with no vegetables in it as a sample and made to get acquainted with its color,flavor,taste and appearance.Then other samples of various vegetable-containing canned meat were given at random to the judges and scores were made based on their evaluation.

Table 5 The sanitary indices of the canned compound carrot-pork

Physicochemical examination	table salt(NaCl%)	sodium nitrite(NaNO <sub>2</sub> mg/kg)	Pb (mg/kg)	Cu (mg/kg)	Sn (mg/kg)
	0.59	4.12	0.01	1.60	9.50
microbiological inspection	total number of microbes(per g)	E.coli (Per 100g)	disease-causing microbe		
	5	No	No		

CONCLUSIONS

3.1 It has been shown in this study that the plant materials of carrot,deodorized soybean protein and refined conjac powder can be added to meat in making compound canned food. The product,in which plant and animal materials each other,possesses desirable color,flavor,taste and appearance,and is easy to be digested and absorbed by the human body.According to the "Recommended Supply of Nutrients in Daily Diet"drafted and revised by the Chinese Society of Nutritional Scientists in October,1988, the supply of vitaminC,retinol equivalent(RE),vitamin E and Zn should be above 60 mg,800ug(equivalent to 4.79 mg of B-carotene),and 15 mg,respectively,and that of protein and Fe should be about 90 and 80 g,and 12 and 18 g for male and female,respectively.Thus,a tin of compound animal-plant food can provide 10.59%,12.43%,24.93%,52.98%(for male) and 59.60%(for female),57.23%(for male) and 38.16%(for female)and 39.7% of vitamin C,B-carotene,vitamin E,protein,Fe and Zn recommended in the document mentioned above.In the compound canned carrot-pork in the present study,more than 10% of the nutrients in the recommended supply in the daily diet is contained.Hence,such canned food may well be taken as an important source of these nutrients.

3.2 The 5.12 g of DF contained in a tin of compound food can stimulate the secretion of digestive juice and the peristalsis of the intestines,and prevent constipation(Eastwood,1978),obesity,diabetes and hypertension(Ched Zeng Shan,1990)

3.3 The konjac mannan(glucomannan) in the compound food can suppress carcinoma of the rectum and reduce the cholesterol in the blood(Kiriyman,S.Okazaki,Y.& Yoshida,A.1969,Chi Den 1983,冲增 哲[Jap.]1990). The average intake of B-carotene from the diet has been shown to be closely related to the incidence of cancer(Wolf G.,1982).B-carotene can be degraded to vitamin A and the relationship of vitamin A and cancer has been of wide interest and attention(Wald NJ et al.,1980;Kart JD et al.1981) at the present time.According to Lan et al.(1990),the level of B-carotene in the blood serum of patients suffering from lung cancer and other lung diseases tended to be low compared to that of the healthy people.T.Hirayama

published a similar report(1979).Vitamin A and Vitamin E can inhibit the formation of tumors via an immune mechanism (Tomita Y.,1983).The study of Van helden showed that the level of vitamin A and E is considerably low in the population with high incidence of esophagus et al.1983).The work of Wang et al.(1990) supported the hypothesis suggested by Peto(1981) that B-carotene has a tumor-resistant effect.A highly significant correlation was observed by N.J.Wald et al and J.D.Kart between low level of vitamin A in the blood serum and high incidence of cancers.

3.4 Limited by the research conditions,the present study was confined to one product of the series of compound canned food.More detailed work on the other products in the series and on the variation of the nutrient components in the course of processing and storage is to be made provided more favorable financial conditions are available.

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