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Solid Material Formula of Small Fragrant Chicken Soup Stock and Improvement of Boiling Process

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Abstract [**Objectives**] To study the solid material formula and boiling process of Small Fragrant Chicken Soup Stock. [**Methods**] Small fragrant chicken and edible fungi were used as the main raw materials to prepare instant chicken and *Morchella esculenta* soup stock, and the influencing factors such as solid material ratio, ratio of liquid to material, time and temperature were studied, and the optimal formula and process of the soup stock were screened out through sensory and instrument evaluation experiments. [**Results**] The optimal formula and process of Small Fragrant Chicken Soup Stock were as follows: small fragrant chicken 40%, *M. esculenta* 6%, *Lyophyllum decastes* 3% and *Lentinus edodes* 1.5%; the ratio of liquid to material was 2.5 : 1, the boiling time was 2 h, and the boiling temperature was 120 ℃. Under these conditions, the sensory score of Small Fragrant Chicken Soup Stock was the best. [**Conclusions**] This study provided a theoretical basis for the industrial production of edible mushroom prepared dishes.

Key words Edible fungi, Instant heating type prepared dishes, Processing technology

1 Introduction

With the improvement in people's consumption level and fast-paced life, instant heating type prepared dishes came into being. The instant heating type prepared dishes are a kind of convenient meal prepared, processed, packaged and transported in advance in a specific cold chain environment, such as pre-fried hairtail, stewed pig's trotters and self-heating hot pot[1]. Based on its advantages of good taste, convenience and low price, prepared dishes are favored by more and more consumers, making them stand out in the fast-paced life of urban residents[2]. *Morchella esculenta* belongs to the genus *Morchella* of Ascomycota, which is mainly distributed in the low altitude plain area to the high altitude range of 3 200 m in China, and the yield of *M. esculenta* ranks first in China[3]. In addition, *M. esculenta* is a rare edible fungus with rich sources, unique flavor and precision. It has not only high nutritional value but also certain medicinal value, so it is generally considered as a natural, nutritious and multi-functional health food. In this study, chicken soup stock *M. esculenta* was prepared with *M. esculenta* as the raw material of prepared dishes. We explored the solid material ratio, ratio of liquid to material, time, temperature in the soup stock, the amount of water, edible mushroom powder and edible alkali in the edible mushroom noodle, and the cooking time, and determined the processing technology and the best formula of the chicken soup stock *M. esculenta* noodle, so as to provide a reference for the healthy development of prepared dishes industry.

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2 Materials and methods

2.1 Main materials and instruments Jianhe small fragrant chicken, *M. esculenta*, *Lyophyllum decastes*, *Lentinus edodes*, salt, onion, ginger, pepper, sugar, Chinese prickly ash powder, cooking wine and oyster sauce (all of which are commercially available food grade). Kubei electronic scale; DHG-9070 A meat grinder; K35 Midea pressure cooker.

2.2 Methods

2.2.1 Preparation of prepared mushroom soup stock. (i) Process flow of prepared mushroom soup stock (Fig. 1).

(ii) Key points of operation. Select small fragrant chicken produced in Jianhe, Guizhou, clean, cut into cubes, soak in water, put in boiling water, cool with cold water to lower the temperature, add cold water to boil small fragrant chicken. Then, add auxiliary raw materials such as salt, shallot, ginger, pepper, white sugar, Chinese prickly ash powder, cooking wine and oyster sauce. Filter the prepared small fragrant chicken raw material soup stock to remove oil. Finally, add *M. esculenta*, *L. decastes and L. edodes* to continue to boil in the pressure cooker 1 000 W. Filter the Small Fragrant Chicken Soup Stock, package and sterilize, and store the obtained finished product at the temperature of −18 ℃ for later use.

2.2.2 Optimization of solid material formula parameters. The basic solid materials of the Small Fragrant Chicken Soup Stock include chicken, *M. esculenta*, *L. decastes*, *L. edodes*, yellow wine, ginger, onion, garlic, *etc.* According to the pre-test optimization, the small fragrant chicken solid material was divided into small fragrant chicken, *M. esculenta*, *L. decastes*, and *L. edodes*.

The indicator was response value, and the suitable dosage range of solid material was determined by single factor and orthogonal experiment through sensory evaluation.

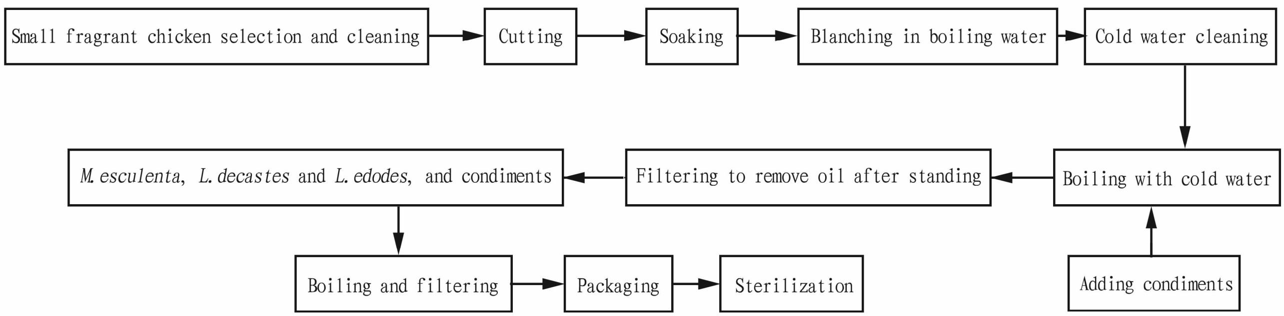

Fig. 1 Process flow of prepared mushroom soup stock

2.2.3 Determination of boiling process parameters. (i) Boiling time. The soup stock was decocted using the method in Section **2.2.1**, in which the ratio of liquid to material parameter was set at 2.5 : 1, the boiling temperature was 120 ℃, and the boiling time was set at 1.0, 1.5, 2.0, 2.5, and 3.0 h, and the results of three parallel tests were taken. The sensory evaluation of the corresponding soup stock was carried out to determine the optimal boiling time. (ii) Boiling temperature. The soup stock was decocted using the method in Section **2.2.1**, in which the ratio of liquid to material parameter was set at 2.5 : 1, the boiling time was set at 2 h, and the boiling temperature was set at 110, 115, 120, 125, and 130 ℃, and the results of three parallel tests were taken. The sensory evaluation of the corresponding soup stock was carried out to determine the optimal boiling time. (iii) Ratio of liquid to material. The soup stock was decocted using the method in Section **2.2.1**, in which the boiling time was set at 2 h, the boiling temperature was set at 120 ℃, the ratio of liquid to material was set at 3.0 : 1, 2.5 : 1, 2.0 : 1, 1.5 : 1, and 1.0 : 1. The results of three parallel tests were taken. The sensory evaluation of the corresponding soup stock was carried out to determine the optimal ratio of liquid to material.

2.2.4 Orthogonal experiment. (i) Solid material ratio. The addition amount (%) of small fragrant chicken, *M. esculenta*, *L. decastes*, and *L. edodes* was used as a factor for the orthogonal experiment, and the sensory score was used as an evaluation indicator to determine the formula of the optimal soup stock solid material. The factor levels are shown in Table 1.

Table 1 Factor level of optimal formula for solid material ratio of small fragrant chicken *M. esculenta* soup stock %

Level	A	B	C	D
	Small fragrant chicken	*M. esculenta*	*L. decastes*	*L. edodes*
1	35	6	3	1
2	40	7	4	1.5
3	45	8	5	2

(ii) Processing parameters. The $L_9(3^4)$ orthogonal experiment was carried out with the ratio of liquid to material, boiling time and boiling temperature of the small fragrant chicken *M. esculenta* soup stock as the influencing factors. The sensory score is used as an evaluation index to determine the optimal process condition factor level, as shown in Table 2.

Table 2 Factor levels of optimal process parameters for soup stock preparation

Level	A	B	C
	Boiling time//h	Boiling temperature//℃	Ratio of liquid to material
1	1.5	115	2.5 : 1
2	2.0	120	2.0 : 1
3	2.5	125	1.5 : 1

2.2.5 Sensory evaluation. After adding seasonings, the boiled soup stock was packed into plastic bowls, each weighing 50 g, and the sensory evaluation of the soup stock was carried out by a 10-member team composed of laboratory researchers, production personnel and sales personnel. The sensory score of each group of samples was given after tasting, and the evaluation criteria used were formulated according to the sensory of the soup stock obtained by the traditional process, as shown in Table 3.

3 Results and analysis

3.1 Optimal formula of solid material ratio for the soup stock

3.1.1 Addition amount of small fragrant chicken. The soup stock was boiled in accordance with the method in Section **2.2.1**, wherein the addition amount of the small fragrant chicken was set at 30%, 35%, 40%, 45% and 50%, the addition amount of the *M. esculenta* was set at 6%, the addition amount of the *L. decastes* was set at 3% and the addition amount of the *L. edodes* was set at 1.5%, the results of three parallel tests were taken. Sensory evaluation was performed on each group of soup stock samples to determine the addition amount of small fragrant chicken, and the results are shown in Fig. 2. The sensory score of the soup stock showed a trend of first increasing and then decreasing with the increase of the addition amount of small fragrant chicken. Before the addition amount of small fragrant chicken was less than 40%, the soup stock was delicious but the characteristic flavor was insufficient. When the addition amount of small fragrant chicken reached 40%, the soup stock not only tasted delicious and mellow, but also had appropriate characteristics and smooth entrance, showing the maximum sensory score. This may be due to the fact that the characteristic flavor substances in the small fragrant chicken are released after accumulating a certain amount at this time, so that the flavor quality of the soup stock is the best. With the continuous increase in the addition amount, the accumulation of flavor substances is excessive, resulting in negative sensory effects. Similar results were found in the addition amount of the Fotiaoqiang Chicken Soup studied by Wu Lizhen[4]. Therefore, the addition amount of small fragrant chicken was 40% in the subsequent experiments.

Table 3 Sensory scoring criteria of the soup stock

Grade//points	Appearance color	Aroma	Quality	Taste	Overall
Excellent (90 – 100)	Pure and uniform color, normal brown color, no sediment and suspended matter, little floating oil	It can smell good meat flavor, fresh flavor and the characteristic odor given by the main ingredients.	The soup stock is mellow, smooth, uniform and has proper viscosity.	Delicious taste, good characteristic flavor and good aftertaste.	Overall sensory quality good, no other unpleasant sensory experience.
Good (80 – 90)	The color is good, slightly light and uniform, with less sediment, suspended solids and floating oil	It has good meat flavor, delicate flavor and characteristic odor endowed by the main ingredients, and has little bad odor.	The soup stock is mellow, smooth, slightly grainy, and has good viscosity.	The taste is delicious, the characteristic flavor is less or heavier, and the aftertaste is better.	The overall sensory quality is good, and there is a slight unpleasant sensory experience.
General (70 – 80)	The color is general, deviating more from the normal color, visible precipitation, more suspended solids and floating oil.	Less pleasant flavor, less meat flavor and less characteristic flavor of the main ingredient, covered by some bad flavor.	The soup stock is thin, not mellow enough, having viscosity.	The taste is general, the fishy smell is heavy, the flavor is bad, and the aftertaste is poor	The overall sensory quality is general, and there is a certain sense of displeasure in the senses.
Poor (60 – 70)	The color is not good, not uniform, white or dark, and there are more sediments, suspended solids and floating oil.	Less pleasant flavor with more unpleasant or undesirable odor.	The soup stock is not mellow, with strong graininess and poor viscosity.	The taste is not good, there is no characteristic flavor, and the aftertaste is strong.	The overall sensory quality is poor, and there are more and obvious unpleasant sensory feeling.

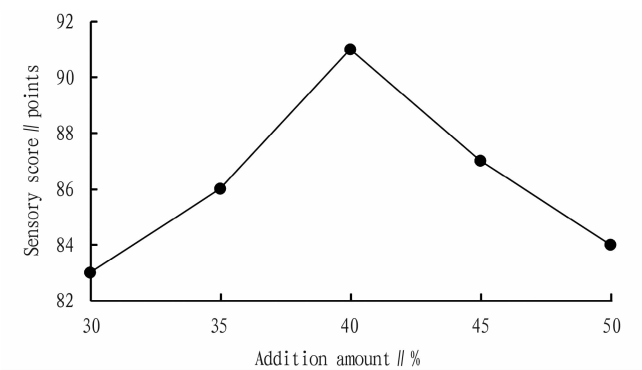

Fig. 2 Effects of the addition amount of small fragrant chicken on the soup stock quality

3.1.2 Addition amount of *M. esculenta*. The soup stock was boiled in accordance with the method in Section **2.2.1**, wherein the addition amount of *M. esculenta* was set at 5%, 6%, 7%, 8%, and 9%, the addition amount of small fragrant chicken was set at 40%, the addition amount of *L. decastes* was set at 3%, and addition amount of *L. edodes* was set at 1.5%. The results of three parallel tests were taken. Sensory evaluation was performed on each group of soup stock samples to determine the addition amount of *M. esculenta*. As shown in Fig. 3, the sensory score of the soup stock increased first and then decreased with the increase of the addition of *M. esculenta*. It is worth noting that the sensory score reached its peak when the addition of *M. esculenta* was 6%, which was due to the degradation of various components of *M. esculenta*, such as protein, fat and carbohydrate, during the boiling of the soup stock. In this process, an important Maillard reaction occurs in *M. esculenta*, resulting in the release of many aromatic components such as lactones, pyrazines and furans[5], which greatly improves the flavor quality of soup stock. Therefore, the addition amount of *M. esculenta* was selected at 6% for the subsequent experiment.

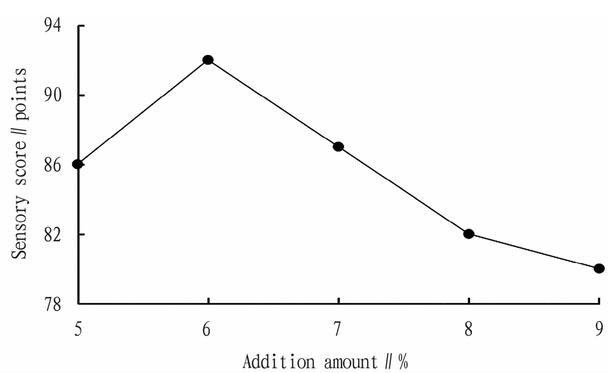

Fig. 3 Effects of the addition amount of *Morchella esculenta* on the soup stock quality

3.1.3 Addition amount of *L. decastes*. *L. decastes* is a kind of precious edible and medicinal fungus. It is rich in flavor, smooth in taste, crisp and silky in the mouth. It is rich in high nutritional value, and its fruiting bodies are also rich in minerals, dietary fiber and vitamins[6]. The soup stock was boiled in accordance with the method in Section **2.2.1**, wherein the addition amount of *L. decastes* was set at 2%, 3%, 4%, 5%, and 6%, the addition amount of small fragrant chicken was set at 40%, the addition amount of *M. esculenta* was set at 6%, and addition amount of *L. edodes* was set at 1.5%. The results of three parallel tests were taken. Sensory evaluation was performed on each group of soup stock samples to determine the addition amount of *L. decastes*. As shown in Fig. 4, the sensory score of the soup stock increased slowly before the addition of *L. decastes* was 3%, and reached the maximum at 3%, and then the sensory score remained almost unchanged with the increase of the addition amount, indicating that when the addition amount was less than 3% , the flavor substances in *L. decastes* were also released continuously until the accumulated concentration of flavor substances exceeded the threshold, resulting in a decrease in the sensory score. After that, it tended to be stable, so the addition amount of *L. decastes* was selected at 3% to continue the experiment.

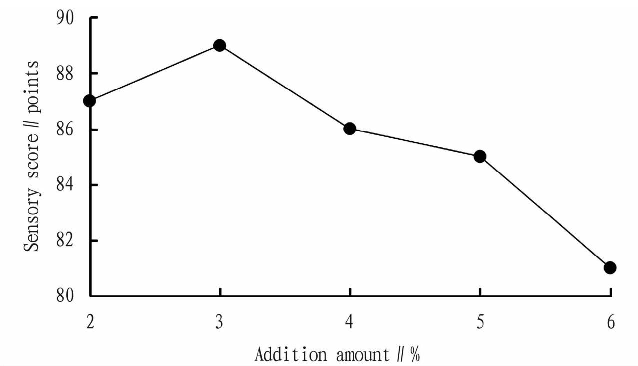

Fig. 4 Effects of the addition amount of *Lyophyllum decastes* on the soup stock quality

3.1.4 Addition amount of *L. edodes*. The soup stock was boiled in accordance with the method in Section **2.2.1**, wherein the addition amount of *L. edodes* was set at 0.5% , 1% , 1.5% , 2% , and 3% , the addition amount of small fragrant chicken was set at 40% , the addition amount of *M. esculenta* was set at 6% , and addition amount of *L. decastes* was set at 3%. The results of three parallel tests were taken. Sensory evaluation was performed on each group of soup stock samples to determine the addition amount of *L. edodes*. As shown in Fig. 5, with the increase in the addition amount of *L. edodes*, the sensory score showed a trend of first increasing and then decreasing, which may be due to the fact that when the addition amount of *L. edodes* reached 1.5% , the dissolution rate of flavor substances was the best, which made the flavor reach the best at this time, and if the addition amount continued to increase, the concentration of flavor substances would be too high, which would have a negative effect on the sensory score. Therefore, in the subsequent experiments, we selected the addition amount of *L. edodes* as 1.5%.

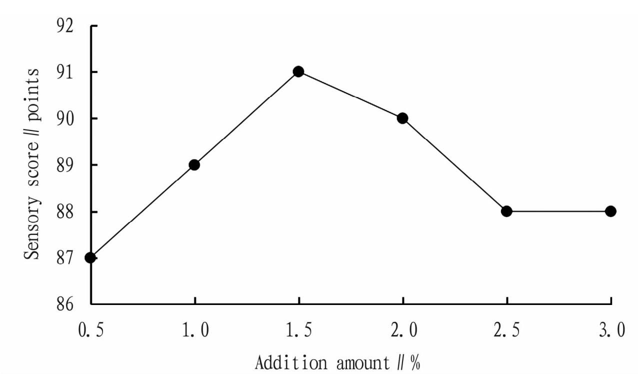

Fig. 5 Effects of the addition amount of *Lentinus edodes* on the soup stock quality

3.1.5 Results of orthogonal experiment. According to the results of the above single factor influence experiment, small fragrant chicken, *M. esculenta*, *L. decastes* and *L. edodes* have greater influence on the flavor quality of the soup stock stock. Therefore, we selected these four factors as the factors of the orthogonal experiment, as shown in Table 4.

Table 4 Orthogonal experiment results of the optimal formula of small fragrant chicken *Morchella esculenta* soup stock solid material ratio

Experiment No.	A	B	C	D	Sensory score // points
1	1	1	1	1	82.41
2	1	2	2	2	85.32
3	1	3	3	3	84.65
4	2	1	2	3	82.50
5	2	2	3	1	88.94
6	2	3	1	2	85.63
7	3	1	3	2	77.21
8	3	2	1	3	80.39
9	3	3	2	1	74.78
K_1	84.13	80.70	82.81	82.04	
K_2	85.69	84.88	80.87	82.72	
K_3	77.46	81.69	83.60	82.51	
R	8.23	4.17	2.73	0.68	

The factors affecting the sensory score of the soup stock were as follows: small fragrant chicken > *M. esculenta* > *L. decastes* > *L. edodes*, and the best formula combination of the soup stock was $A_2B_2C_3D_2$, that is, the addition of small fragrant chicken was 40%. When the addition amount of *M. esculenta* was 6% , *L. decastes* was 3% and *L. edodes* was 1.5% , the soup stock was the best.

3.2 Determination of process parameters

3.2.1 Boiling time. The effect of the boiling time of the soup stock on the sensory score is shown in Fig. 6. With the increase in boiling time, the sensory score of the soup stock showed a trend of first increasing and then decreasing. When the boiling time was 1.5 h, the nutrients in the raw materials were continuously precipitated during the boiling process, and gradually accumulated, but the upward trend was relatively slow, until the boiling time reached 2 h, the flavor substances and nutrients in the raw materials were the most abundant. At this time, the sensory score reaches the highest. With the increase in boiling time, the continuous boiling of the soup stock leads to the continuous vaporization of water to form water vapor, which reduces the amount of soup stock to a certain extent, resulting in the deepening of the appearance color of the soup stock and even the bitter taste, resulting in the gradual decrease of the sensory score[7]. Therefore, the boiling time was set to 2 h in subsequent experiments.

3.2.2 Boiling temperature. The effect of boiling temperature on the sensory score of soup stock is shown in Fig. 7. The sensory score of the soup stock was the highest at 120 ℃ and the lowest at 130 ℃, which may be due to the fact that the Maillard reaction produced before 120 ℃ promoted the caramelization of sugars, resulting in a large number of positive flavor substances, thus continuously improving the flavor quality of the soup stock. When the boiling temperature exceeded 120 ℃, the Maillard reaction continued to produce substances with bad flavor, and the proteins in the soup stock were also decomposed at high temperature to produce small molecules with bitter taste, resulting in the decline of the overall flavor of the soup stock. Therefore, the boiling temperature was selected at 120 ℃ in the subsequent experiments.

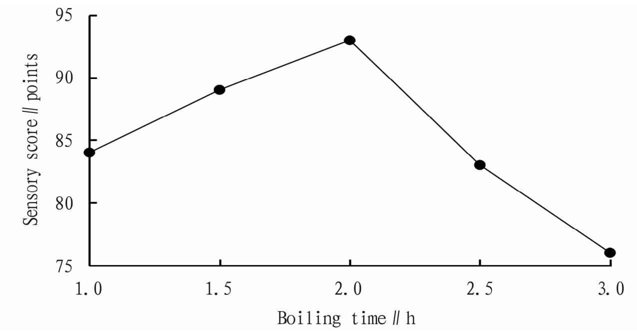

Fig. 6 Effects of boiling time of the soup stock quality

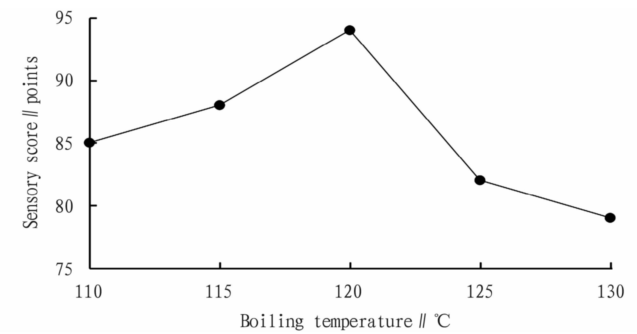

Fig. 7 Effects of boiling temperature of the soup stock quality

3.2.3 Ratio of liquid to material. The effects of the ratio of liquid to material in the boiling process on the sensory score of the soup stock were shown in Fig. 8. When the ratio of liquid to material decreased gradually, the sensory score of the soup stock showed a trend of first increasing and then decreasing. It is worth noting that when the value of ratio of liquid to material is 2.5 : 1, the sensory score is the best, which may be due to the fact that the concentration of flavor substances in the soup stock exceeded the threshold when the addition amount of water was small, thus causing negative effects on human senses. However, when too much water was added, the concentration of flavor substances in the soup stock will be insufficient. Therefore, the ratio of liquid to material in the subsequent experiments was selected at 2.5 : 1.

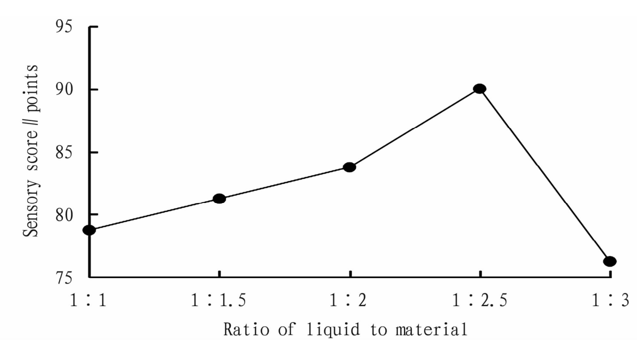

Fig. 8 Effects of ratio of liquid to material on the soup stock quality

3.3 Results of orthogonal experiment On the basis of the results of the single factor experiment, the boiling process of the Small Fragrant Chicken Soup Stock was determined through the orthogonal experiment, and the results are shown in Table 5. The order of the factors affecting the sensory score of the soup stock was B > A > C, and the best combination of process parameters was $A_1B_2C_2$, that is, ratio of liquid to material 2.5 : 1, boiling time 2 h and boiling temperature 120 ℃. Under these conditions, the small fragrant chicken *M. esculenta* soup stock had the best taste.

Table 5 Orthogonal experiment results of optimal process parameters for soup stock preparation

Experiment No.	A	B	C	D	Sensory score // points
1	1	1	1	82.41	
2	1	2	2	85.32	
3	1	3	3	84.65	
4	2	1	2	82.50	
5	2	2	3	88.94	
6	2	3	1	85.63	
7	3	1	3	77.21	
8	3	2	1	80.39	
9	3	3	2	74.78	
K_1	84.33	82.18	80.25		
K_2	80.43	84.01	83.28		
K_3	81.40	79.97	82.63		
R	3.90	4.04	3.04		

4 Conclusions

Soup stock has the characteristics of balanced flavor, outstanding flavor and lasting fragrance, so it is popular in the catering industry. In this study, we determined the optimal formula and processing parameters of the soup by studying the solid material ratio, ratio of liquid to material, boiling temperature and time of the Small Fragrant Chicken Soup Stock. Finally, we reached the following conclusions: the addition amount of small fragrant chicken is 40%, the addition amount of *M. esculenta* is 6%, the addition amount of *L. decastes* is 3% and the addition amount of *L. edodes* is 1.5%. In addition, the optimum processing parameters were ratio of liquid to material: 2.5 : 1, and the boiling time and temperature are 2 h and 120 ℃, respectively. Under these conditions, not only the nutrients can be fully dissolved, but also the flavor is the optimal.

References

[1] TENG HF, LI B, HU B. Taking standard as "track" and certification as "flag" to lead the sustainable development of prepared dish industry[J]. Quality and Certification, 2023(9): 36 – 37. (in Chinese).

[2] CAO JJ, SUN DF, GOU XL, *et al*. Analysis and prospect of current processing situation of the prefabricated edible fungi dishes[J]. Edible Fungi of China, 2022, 41(10): 62 – 65. (in Chinese).

[3] GONG P, WANG JT, LONG H, *et al*. Research progress on physical and chemical preservation methods and mechanism of *Morchella esculenta*[J]. Food and Fermentation Industry, 2023-09-11. 1 – 11. (in Chinese).

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5 h, and yield of eucalyptus oil 1.51%[4]. In this paper, the technical conditions of extracting essential oil from eucalyptus leaves by distillation were studied. The results were as follows.

Table 2 Results and analysis of orthogonal test

Item	Extraction time (A)//h	Soaking time (B)//h	Solid-liquid ratio (C)	Vacant column	Oil yield//%
1	1	1	1	1	0.50
2	1	2	2	2	0.57
3	1	3	3	3	0.48
4	2	2	3	1	0.80
5	2	3	1	2	0.67
6	2	1	2	3	0.74
7	3	3	2	1	0.63
8	3	1	3	2	0.78
9	3	2	1	3	0.69
K_1	1.55	2.02	1.86	1.93	
K_2	2.21	20.60	1.94	2.02	
K_3	2.10	1.78	1.97	1.91	
K_1	0.52	0.67	0.62	0.64	
K_2	0.74	0.69	0.65	0.67	
K_3	0.70	0.59	0.66	0.64	
R	0.22	0.10	0.04	0.03	
Primary and secondary order		A > B > C			
Optimal level	A_2	B_2	C_3		
Optimal combination		$A_2B_2C_3$			

(i) Extraction time, soaking time and solid-liquid ratio had impacts on the yield of essential oil. The yield of essential oil increased with the increase of extraction and soaking time, but the yield of essential oil decreased with the extension of time after exceeding the optimal value.

(ii) The increase of solid-liquid ratio would increase the yield of essential oil, but when exceeding a certain value, the increase of yield became smooth, and the cost performance decreased.

(iii) The optimal extraction parameter combination was $A_2B_2C_3$, that is, extraction time 1.5 h, soaking time 2 h and solid-liquid ratio of eucalyptus leaves to distilled water 1 : 10, and the yield of essential oil was the highest of 0.8%.

References

[1] XU TW, ZHOU LP, YAN JC, *et al.* The controlled release and bacteriostatic effect of eucalyptus essential oil embedded in fish gelatin gel[J]. Food and Nutrition in China, 2020, 26(5): 39-43. (in Chinese).

[2] ZHANG WQ, MIAO HC. Preparation technology of eucalyptus essential oil microcapsules for aromatic and antibacterial finishing of fabric[J]. Textile Industry and Technology, 2021, 50(9): 17-18, 23. (in Chinese).

[3] LI W, YAO JW, JING YH, *et al.* Film forming properties of polyvinyl alcohol/plant derived antibacterial agent (eucalyptus essential oil) composite film material[J]. Textile Industry and Technology, 2019, 48(3): 6-9. (in Chinese).

[4] LU K, ZHOU HJ, TANG J, *et al.* Process optimization and antibacterial activity of extracting essential oil from *Eucalyptus globulus* leaves by ultrasonic assisted steam distillation[J]. Journal of Food Safety & Quality, 2019, 10(13): 4358-4364. (in Chinese).

[5] HU XF, TIAN ZQ, PEI HS, *et al.* Optimization of short-path molecular distillation technology for refining essential oil from *Eucalyptus grandis* leaves[J]. Transactions of the Chinese Society of Agricultural Engineering, 2018, 34(2): 299-307. (in Chinese).

[6] REN XL, YUE SL, XIANG H, *et al.* Process optimization of microencapsulation and controlled-release properties on the eucalyptus essential oil[J]. Packaging Engineering, 2017, 38(9): 107-112. (in Chinese).

[7] TIAN YH, LIU XM, ZHOU YH, *et al.* Chemical composition of eucalyptus oil from different distillation periods[J]. China Journal of Chinese Materia Medica, 2006(19): 1641-1643. (in Chinese).

[8] LIU WP. Current situation and sustainable development strategy of eucalyptus planting in Guangxi[J]. World Tropical Agriculture Information, 2022(12): 79-80. (in Chinese).

[9] FENG HL. Problems and countermeasures of sustainable development of planted forest of Eucalyptus robusta Smith in Guangxi[J]. Forest By-product and Speciality in China, 2022(5): 92-94. (in Chinese).

(From page 16)

[4] WU LZ, XUE WQ, ZENG YF. Improvement of solid ingredients formula and cooking process of Fotiaoqiang Stock[J]. Journal of Fujian Polytechnic Normal University, 2022, 40(2): 146-152,167. (in Chinese).

[5] LI Q, ZHU KX, ZHOU HM. Electric nose analysis of the effect of cooking time on the flavor of three species of edible mushroom soups[J]. Food Science, 2010, 31(16): 151-155. (in Chinese).

[6] CHENG JH. The commercial production situation and prospects of the new valuable edible and medicinal mushroom, *Lyophyllum decastes*[J]. Edible and Medicinal Mushrooms, 2014, 22(4): 194-197. (in Chinese).

[7] YANG MD, SHEN CY, ZHANG GS. Thoughts on the present development situation of fresh soup and its growing trend[J]. Culinary Science Journal of Yangzhou University, 2006(4): 23-25. (in Chinese).