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Improvement of Chinese traditional goat ham flavor by starter cultures (#125)

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Introduction

Goat meat products have a long history in China. Among the nearly a hundred kinds of products, including cured, marinated and grilled meat products, the goat ham (Feng Yang Tui), a natural air-dried cured goat legs, is one of the most representative traditional cured meat products. To make goat ham, the raw material fresh lamb leg is dressed, salted, cured, naturally-dried and stored till its ripening, which will last more than 30 days. During the processes of air-drying, a series of small molecule compounds, such as aldehydes, ketones and acids, are gradually produced and consequently lead to the unique flavor characteristics. In the present study, starter cultures was applied to further improve the Chinese traditional goat ham flavor.

Methods

Processing procedures: Goat ham was produced by traditional method (control) and addition of starter cultures SM-194 (sample), respectively. The goat hind legs was cured in a container at 4 °C for 12 days after dressing and adding salt and up and down stirred for 3 to 4 times. Then, the samples were washed and hanged and subsequently natural air-dried until the water dehydrated up to 15%. After that, the samples were cut and trimmed and followed by fermentation and air-dry for 18 days until weight lost by 30-32% at 8-12 °C with the relative humidity of 50-65%. Finally, the samples were cut into small size and vacuum packaged. The product of goat ham will be well prepared after 30 days post-fermentation at 6-8 °C.

Determination of volatile aroma components: The solid phase micro-extraction was performed by using the equipment of HP 6890/5973 GC/MS under the conditions: solid phase micro-extraction probe: CAR/PDMS 75 µm, extraction temperature 80 °C, extraction 40 min, desorption 3 min, column HP-INNOWAX 30 m*0.25 mm*0.25 µm, temperature at sample inlet 250 °C, split ratio 2:1. The temperature was first kept at 50 °C for 3 min. Then, the temperature was increased to 150 °C at the ratio of 5 °C/min. Finally, it was increased from 150 °C to 260 °C at the ratio of 10 °C/min.

Results

The volatile aroma components of goat ham were tested by using GC-MS, as shown in Table 1. The flavor components of the control without starter cultures and sample with starter cultures were counted as follows. 6 types of flavor components were found in control without starter cultures, including alcohols (34.181%), acids (27.695%), aldehydes (7.922%), ketones (6.405%), alkenes (4.733%) and phenols (2.216%). However, esters was not detected

in control. While for sample with starter cultures, 7 types flavor components were detected, consisting of alcohols (39.064%), aldehydes (23.389%), acids (15.424%), alkenes (7.980%), esters (4.280%), ketones (2.350%) and phenols (0.125%). Only 25 types of volatile aroma materials were detected in control, including acids (8 types), alcohols (5 types), aldehydes (4 types), alkenes (3 types), phenols (3 types), ketones (2 types). However, 41 types of volatile aroma materials were detected in sample, containing aldehydes (13 types), alcohols (8 types), acids (8 types), esters (5 types), ketones (3 types), alkenes (2 types), phenols (2 types).

Table 1. Comparison of volatile flavor in goat ham.

Varieties	Compounds	Control (%)	Sample (%)
Hydrocarbon	Myrcene	0.705	1.060
	Bornylene	2.061	/
	Limonene	/	6.920
	3-Cyclohexen	1.967	/
	Total	4.733 (3 types)	7.980 (2 types)
Alcohols	Ethanol	19.540	24.839
	1-Pentanol	1.661	0.802
	1-Hexanol	/	0.115
	2-Octen-1-ol	/	1.396
	Linalool	11.857	6.460
	1-Octanol	/	0.986
	α-Terpineol	1.123	2.535
	benzil alcohol	0.252	2.046
	Total	34.433 (5 types)	39.179 (8 types)
Aldehydes	Hexanal	/	2.476
	Heptanal	/	1.543
	Octanal	0.210	2.573
	Nonanal	7.234	7.848
	Decanal	/	1.203
	Octenal	/	0.250
	Benzaldehyde	0.260	3.765
	2-Nonenal	/	1.517
	trans-2-Decenal	/	0.766
	4-Ethylbenzaldehyde	/	0.622
	2-Undecenal	/	0.551
	4-Isopropylbenzaldehyde	/	0.525
	Pentadecanal	0.688	/
	Hexadecanal	0.140	/
	Total	8.392 (4 types)	23.779 (13 types)

Notes

Varieties	Compounds	Control (%)	Sample (%)
Ketones	3-Hydroxy-2-butanone	2.701	3.542
	3-methyl-6-(1-methylethyl)-2-cyclohexen-1-one	3.704	/
	2,3-Diketone	/	2.061
	3,5-diene ketone	/	0.289
	Total	6.405 (2 types)	5.892 (3 types)
Acids	Acetic acid	22.816	9.973
	Butanoic acid	2.132	0.220
	Pentoic acid	0.120	/
	Hexanoic acid	/	0.878
	Heptanic acid	1.902	/
	Caprylic acid	0.845	0.145
	Nonanoic acid	0.160	2.543
	Decanoic acid	0.130	2.030
	Cis-2-decyl acid	/	0.210
	Dodecanoic acid	0.120	/
	Hexadecanoic acid	/	0.140
	Total	28.225 (8 types)	16.144 (8 types)
Hydroxybenzenes	Phenol	0.110	0.125
	3-methyl phenol	/	0.105

Varieties	Compounds	Control (%)	Sample (%)
	4-methyl phenol	0.150	/
	Eugenol	2.216	/
	Total	2.476 (3 types)	0.230 (2 types)
Esters	Ethyl caprylate	/	2.532
	2-methyl propionic acid-1-methyl-1-(4-methyl-3-cyclohexene-1-base) ethyl ester	/	0.140
	Ethyl caprate	/	1.748
	Ethyl myristate	/	0.155
	Ethyl palmitate	/	0.110
	Total	0	4.685 (5 types)
	Total types	25	41

Conclusion

In the present study, volatile flavor of the Chinese traditional goat ham was significantly improved by the starter cultures. The sample with starter cultures was more abundant in type and content of alcohols, aldehydes and esters.

Notes