P-05-01

Effects of added yak blood on physicochemical, textural and sensory characteristics of fermented yak blood sausage (#219)

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Introduction

China is the country with the largest number of yaks in the world, accounting for 95% of the total number of yaks in the world. As the major by-product of yak slaughtering, blood is an ideal protein resource. It was reported that the protein contents of whole blood, plasma and blood cells in yak was about 15.5%, 6.9 %, 32.7 %, respectively. However, most of the blood was discharged as waste, which not only caused environmental pollution, but also produced large amount of waste. How to efficiently utilize the yak blood is a problem to be solved urgently. Currently, only small portion of the yak blood has been used for sausage making in the nomadic families and no blood sausages have been commercialized or studied. The objectives of this study were to produce a fermented yak meat sausage with blood, and to evaluate the effects of adding various level of yak blood on the quality of fermented yak blood sausage.

Methods

Yak meat and yak blood were collected from Hongyuan local slaughterhouse and frozen at -18℃ for 24 h, and shifted back to laboratory. Meat and blood were thawed under room temperature before sausage making. Yak meat mixed with 0, 15, 20, 25, 30, or 35% of yak blood and 1% starter to make sausages. The pH values, cooking loss, color difference, textural and sensory properties of yak blood sausages were investigated after fermentation at 30℃ for 18 hours , and the optimal amount of yak blood for sausage preparation was determined. ANOVA was used for variance analysis and significance test with SPSS V19.0 software package.

Results

The results were displayed in table 1-2. It is obvious that the pH value, cooking loss, color difference, textural characteristics and sensory scores of fermented yak sausage were significantly affected by adding yak blood ($P < 0.05$), Resillence of the sausage was not significantly affected ($P > 0.05$).

From Table 1, pH value was fluctuated at 4.4 for all sausages after 18 h fermentation. Cooking loss decreased sharply and significantly after adding 15% of blood, but no significant changes were noticed adding 15-35% of blood. Sausages with adding 20-25% of yak blood had relatively high sensory scores ($P < 0.05$). During sausage preparation, adding yak blood may influence binding capacity of meat, water content and protein content, which may cause the change of cooking loss. It also showed that with the elevated addition of yak blood, the L* value and b* value rapidly decreased ($P < 0.05$). Adding blood generally increased the a* value, but the value decreased gradually with the added amount increased. Myoglobin is the main color substance of meat, while hemoglobin is the main color substance of yak blood. The sausage can be colored by adding yak blood, which gives the sausage a unique red color.Table 1 Effects of blood addition on physicochemical properties ,color and sensory quality of fermented blood sausage

Blood , %	pH	Cooking loss,%	Sensory scores	L*	a*	b*
0	4.48±0.04^{a}	30.47±0.00^{a}	87.40±1.64^{b}	46.85±2.30^{a}	7.76±0.23^{c}	9.37±0.68^{a}
15	4.48±0.02^{a}	24.33±0.01^{b}	90.10±2.07^{b}	24.12±0.62^{b}	11.82±0.37^{a}	5.80±0.47^{b}
20	4.41±0.03^{b}	23.83±0.01^{b}	93.90±0.74^{a}	21.39±0.85^{c}	10.23±0.67^{b}	5.80±0.19^{b}
25	4.48±0.04^{a}	23.57±0.01^{b}	93.50±1.58^{a}	19.17±0.96^{d}	10.20±0.56^{b}	5.79±0.52^{b}
30	4.40±0.04^{b}	24.70±0.01^{b}	87.50±1.58^{b}	19.15±0.88^{d}	7.46±0.38^{c}	3.73±0.20^{d}
35	4.41±0.01^{b}	25.23±0.01^{b}	84.50±3.71^{c}	19.06±1.67^{d}	7.33±0.39^{c}	4.38±0.37^{c}

Note: Data followed with different lower-case letters in the same column showed significant difference ($p < 0.05$).

Table 2 showed that with the increase of blood addition, the hardness and chewiness of fermented sausage demonstrated a decrease trends and no changes were found after adding more than 20% of yak blood, while springiness and cohesiveness had increased trends and resillence were almost not affected.Table 2 Effect of blood addition on textures of fermented blood sausage

Blood , %	Hardness(g)	Springiness(cm)	Cohesiveness	Chewiness(g)	Resillence
0	4192.08±802.99^{a}	0.63±0.01^{c}	0.57±0.03^{c}	1493.50±164.50^{a}	
15	3907.58±254.22^{a}	0.66±0.00^{bc}	0.58±0.01^{bc}	1505.12±92.47^{a}	0.07±0.01^{b}
20	1920.11±479.07^{b}	0.66±0.01^{bc}	0.62±0.01^{b}	782.41±167.39^{b}	
25	1756.58±173.91^{b}	0.66±0.01^{bc}	0.59±0.01^{bc}	710.68±82.06^{b}	0.06±0.00^{b}
30	1800.64±795.91^{b}	0.68±0.01^{ab}	0.61±0.04^{bc}	761.80±267.27^{b}	0.08±0.03^{b}
35	1314.95±267.86^{b}	0.71±0.02^{a}	0.66±0.02^{a}	580.63±73.96^{b}	0.12±0.03^{a}
0.08±0.00^{b}					
0.08±0.02^{b}					

Note: Data followed with different lower-case letters in the same column showed significant difference ($p < 0.05$).

Conclusion

Adding various percentages of yak blood into yak meat coupled with fermentation significantly impacts the cooking loss, sensory characteristics and textural properties of yak meat sausage . Fermented yak meat sausage prepared with 20% of yak blood is acceptable in edible quality.

Notes