COMPARISON OF THE QUALITY OF TRADITIONAL AND CONVENTIONAL DRY SAUSAGES COLLECTED FROM NORTHEAST CHINA

Huiping Wang, Xiangao Li, Dongmei Zheng* and Qian Chen*

College of Food Science, Northeast Agricultural University, Harbin, Heilongjiang 150030, China

*Corresponding author email: zdm1234@126.com (D. Zheng); chenqianego7@126.com (Q. Chen)

I. INTRODUCTION

Traditional dry sausage is produced by operators manually mixing minced raw material into pig small intestine casings, and then allowing it to air dry in a ventilated environment [1]. However, industrial roasting technology is adopted in the conventional technique instead of natural air drying, which achieves a similar moisture content to traditional dry sausage. Therefore, the purpose of this study was to compare the quality of traditional and conventional dry sausages.

II. MATERIALS AND METHODS

Traditional dry sausages were purchased from five cities in Heilongjiang Province China: Suihua (SH), Daxing'anling (DXAL), Hegang (HG), Mudanjiang (MDJ) and Harbin (HRB). And conventional dry sausages were collected from five food companies in China: Qiulin Lidaosi (QL), Harbin Nongda Red Sausage (ND), Yishoudian (YSD), Yuchang (YC) and Harbin Roulian (HRL). The chemical composition of dry sausages, including moisture, salt (NaCl), protein and fat contents, were determined with reference to the ISO standards [2-5]. The a_w and pH was measured according to the method of Wen et al. [6]. Lipid oxidation was determined by the thiobarbituric acid-reactive substances (TBARS) assay according to Chen et al. [1]. Data were statistically analysed using the General Linear Model (GLM) program in Statistix 8.1 software package. An analysis of variance (ANOVA) with Tukey' s multiple comparison was used to assess the significance of the sample effects ($P < 0.05$).

III. RESULTS AND DISCUSSION

As indicated in Table 1, the moisture contents of traditional dry sausages (27.02%–32.61%) were lower than those of conventional dry sausages (34.22%–42.79%), and the aw values of the traditional dry sausages were also relatively low. The low moisture content and aw of traditional dry sausages may be due to moisture loss during the long drying and fermentation process. By contrast, the higher moisture content of the conventional dry sausages was due to the shorter drying time or roasting process, and although the surface moisture was lost quickly, more of the internal moisture was retained. The traditional sample DXAL (2.81%) had the highest NaCl content, followed by the HRB (2.74%), SH (2.67%), YSD (2.61%), HG (2.38%), ND (2.27%), MDJ (2.21%), YC (2.06%), QL (2.00%) and HRL (2.00%) samples. In addition, the protein and fat content of the 10 samples ranged from 22.66% to 38.73% and 12.55% to 26.49%, respectively. The pH value of traditional dry sausages and conventional dry sausages ranged from 5.42 to 5.52 and from 5.76 to 5.84, respectively, with MDJ (5.42) and SH (5.44) samples (traditional dry sausages) displaying significantly lower pH values than those of the other samples ($P < 0.05$). Organic acids likely contributed to the low pH value. Organic acids are produced by the growth and metabolism of lactic acid bacteria, which are essential in traditional fermented dry sausages to kill or inhibit spoilage and pathogenic microorganisms. The TBARS values of the 10 samples ranged from 0.54 to 1.46 mg/100 g, and the significantly highest TBARS value was detected in the traditional sample DXAL ($P < 0.05$). However, no significant differences were found among the TBARS values of MDJ, YC, ND, YSD and

HRL samples (P > 0.05). It is reported that the TBARS value reflects the degree of lipid oxidation of products and is closely related to the colour and flavour of meat products.

Table 1 Means values of physicochemical characteristic of traditional dry sausages collected from various wet markets and conventional dry sausages.

Sample	Moisture content (%)	NaCl content (%)	Protein content (%)	Fat content (%)	pH	Water activity	TBARS (mg/100 g)
Traditional dry sausages							
SH	29.0^{f}	2.67^{ab}	32.8^{bc}	24.8^{ab}	5.44^{e}	0.865^{de}	0.590^{ef}
DXAL	32.6^{de}	2.81^{a}	32.5^{bc}	24.5^{ab}	5.52^{d}	0.817^{g}	1.46^{a}
HG	28.9^{f}	2.38^{c}	33.5^{b}	21.9^{abc}	5.51^{d}	0.857^{e}	0.670^{de}
MDJ	27.0^{f}	2.21^{cde}	33.3^{b}	24.2^{ab}	5.42^{e}	0.875^{bc}	0.840^{c}
HRB	31.8^{e}	2.74^{ab}	38.7^{a}	17.1^{cde}	5.50^{d}	0.840^{f}	0.540^{f}
Conventional dry sausages							
QL	42.8^{a}	2.00^{f}	22.7^{e}	15.7^{de}	5.66^{c}	0.919^{a}	0.970^{b}
YC	39.4^{b}	2.06^{ef}	28.7^{cd}	12.6^{e}	5.73^{b}	0.911^{a}	0.800^{c}
ND	35.4^{c}	2.27^{cd}	25.3^{de}	19.7^{bcd}	5.76^{b}	0.883^{b}	0.800^{c}
YSD	40.7^{ab}	2.61^{b}	23.8^{e}	13.9^{e}	5.84^{a}	0.873^{c}	0.820^{c}
HRL	34.2^{cd}	2.00^{f}	33.8^{b}	26.5^{a}	5.72^{b}	0.878^{bc}	0.820^{c}
SEM	0.952	0.056	0.925	0.896	0.058	0.005	0.045
P-value	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01

Data are presented as mean (n = 3, 3 replicates per treatment) and SEM, SEM -Standard error of mean, a-f Differences in same column indicate significant differences (P < 0.05). SH: Suihua; DXAL: Daxing'anling; HG: Hegang; MDJ: Mudanjiang; HRB: Harbin; QL: Qiulin Lidaosi; ND: Harbin Nongda Red Sausage; YSD: Yishoudian; YC: Yuchang; HRL: Harbin Roulian.

IV. CONCLUSION

The results showed that traditional dry sausages were differ to conventional dry sausage. Primarily, traditional dry sausages were characterised by a low moisture content, low aw and high shear force due to the long drying process. The results of this study provide a theoretical basis for the future production of dry sausages. In the future, sensory properties and flavour substances will be studied.

ACKNOWLEDGEMENTS

Kong B. H. thanks the financial support from the National Natural Science Foundation of China (grant no. U22A20547) and Chen Q. thanks the financial support from the National Natural Science Foundation of China (grant no. 32172232).

REFERENCES

1. Chen, Q., Kong, B., Han, Q., Xia, X., & Xu, L. (2017). The role of bacterial fermentation in lipolysis and lipid oxidation in Harbin dry sausages and its flavour development. LWT-Food Science and Technology 77: 389-396.
2. ISO. (1973). Meat and meat products—Determination of total fat content. Volume ISO 443.
3. ISO. (1978). Meat and meat products—Determination of nitrogen content (Reference method). Volume ISO 937.
4. ISO. (1996) Meat and meat products—Determination of chloride content. Volume ISO 1841-1.
5. ISO. (1997). Meat and meat products—Determination of moisture content (Reference method). Volume ISO 1442.
6. Wen, R., Lv, Y., Li, X. A., Chen, Q., & Kong, B. (2021). High-throughput sequencing approach to reveal the bacterial diversity of traditional yak jerky from the Tibetan regions. Meat Science 17: 108348.