3-P11

Effect of carragenan, corn syrup solids, whey protein concentrate and isolated soy protein on the quality of emulsified – style chicken liver sausage

Hung-Jung Chin, Deng-Cheng Liu and Ming-Tsao Chen
Dept. of Animal Science, National Chung-Hsing University, 250 Kao-Kuang Road , Taicuung, Taiwan 400, ROC

Introduction

Liver is one of the edible giblets of chicken and can be used as an ingredient in liver sausage or emulision type products due to the richest source of iron, vitamin A and B groups(USDA,1983). Several non-meat additives such as ISP, whey protein, egg white, etc., has been used as binders or stabilizers to improve texture, appearance and palatability in emulsion type meat products(Rakosky,1970). However, develop a good quality of chicken liver sausage is important to poultry industry for increasing consumption of chicken liver. The aim of this study was to investigate the effect of four non-meat additives – carragenan, corn syrup solids, whey protein concentrate and isolated soy protein, on the quality of emulsified– style chicken liver sausage.

Materials and Methods

Sausage preparation : The basic formulation for chicken liver sausage contained 45 % chicken liver, 30 % pork picnic meat and 25 % back fat. A total of 5 lots was divided as follows : control – no additives, Carr – 0.2 % carragenan, CSS – 1.0 % corn syrup solids, WPC – 1.0 % whey protein concentrate and ISP – 1.0 % isolated soy protein. The products were cooking at 85℃ until an internal temperature of 68℃ was reached. The sausages were vacuum packaged and stored at 4℃ for storage tests.

Analysis : Chemical contents of products were determined according to AOAC(1984). Sensory property(color, flavor, texture, juiciness and overall acceptance) were assessed by a panel group(12 members). Breaking strength of sausages were measured with the Fudoh Rheometer(NRM-2010J-CW, Japan). The TBARS content, total plate counts and pH value were done at the 0, 4, 7, 14, 21, 28 day of the storage period.

Results and Discussion

Table 1 showed moisture, crude fat and ash content of all products were 52.45~55.54 %, 20.16~23.11 % and 2.44~2.60 %, respectively. The moisture of the Carr treatment was significantly lower than the others and the control($P<0.05$). Otherwise, the crude fat of the control was significantly higher than all treatments. In breaking strength, Carr treatment exhibited markedly highest value than the others(Fig.1). The results of sensory evaluation for chicken liver sausage were shown in Table 2. The WPC treatment had the highest score in flavor. The panelists had similar texture scores for all treatments. In overall acceptance, the CSS treatment had the highest score but the score of the ISP treatment lower than the others. This result might caused by a beany flavor induced from soy products(Claudia and Mary, 1975). The TBA value of all treatments maintained stable during storage(Fig. 2). But at the 28th day, the TBA value of the ISP treatment was aboved 4 mg malonaldehyde / kg. The TPC of all treatments were aboved 5 log CFU / g at the end of storage. The pH values of products were 6.58~6.62 at the initial storage and kept stable during storage.

Conclusion

Except 1.0 % ISP due to a slight off-flavor on sensory panel, the other additives such as carragenan, corn syrup solids, whey protein concentrate were suitable for improving the quality of chicken liver sausage.

Referances

A. O. A. C.(1984). Official methods of analysis. 14th ed. Association of official analytical chemist. Washington, D. C.

Claudia, W. W. and E. Z. Mary (1975). Quality characteristics of soy-substituted ground beef, pork and turkey meat loaves. J. Food Sci. 40 : 502-505

Rakosky, J.(1970). Soy products for meat industry. J. Agric. Food Chem.18 : 1005

US Department of Agriculture(1983). Composition of Foods : Pork Products; Raw, Processed, Prepared, USDA Agriculture Handbook No. 8-10. USDA, Washington, D.C.

Table 1. Proximate analysis of chicken liver sausage [d]

Samples[e]	Moisture	Crude Fat	Ash (%)
Control	54.15 ± 0.49^{ab}	23.11 ± 0.39^{a}	2.44 ± 0.34^{b}
Carr	52.45 ± 0.49^{c}	20.34 ± 0.39^{bc}	2.60 ± 0.34^{a}
CSS	55.54 ± 0.49^{a}	20.27 ± 0.39^{c}	2.49 ± 0.34^{ab}
WPC	53.77 ± 0.49^{b}	21.54 ± 0.39^{b}	2.49 ± 0.34^{b}
ISP	54.11 ± 0.49^{ab}	20.16 ± 0.39^{c}	2.51 ± 0.34^{ab}

[a-c] The same superscripts within columns indicate no significant difference ($P>0.05$)

[d] mean±S.E., n=3

[e] Control=no binder; Carr=control+0.2 % carragenan; CSS=control + 1.0 % corn syrup solids; WPC=control+1.0 % whey protein concentrate; ISP=control+1.0 % isolated soy protein

Table 2. Analysis of panel score[d] of chicken liver sausage added without or with different binders

Items	Treatments				
	Control	Carr	CSS	WPC	ISP
Color	4.6±0.1[a]	5.0±0.2[a]	4.7±0.2[a]	5.0±0.2[a]	4.7±0.2[a]
Flavor	4.8±0.1[ab]	4.4±0.2[b]	4.9±0.2[ab]	5.0±0.2[a]	4.4±0.2[b]
Texture	4.6±0.1[a]	4.6±0.2[a]	4.8±0.2[a]	4.6±0.2[a]	4.4±0.2[a]
Juiciness	4.9±0.1[ab]	4.3±0.2[c]	5.0±0.2[a]	4.4±0.2[bc]	4.3±0.2[c]
Overall Acceptance	4.8±0.1[ab]	4.6±0.2[ab]	5.1±0.2[a]	4.8±0.2[ab]	4.4±0.2[b]

[a-c] Different superscripts in the same row indicate significantly different ($P<0.05$)
[d] A 7 point hedonic scale test was used in this study. 1 = extremely dislike, 4 = neither like nor dislike, 7 = extremely like

Table 3. Changes of total plate counts(log (CFU/g)) of chicken liver sausage with different binders during cold storage(4℃)

Treatments	Storage Time					
	0	4	7	14	21	28 (days)
Control	2.7±0.1[bz]	2.7±0.1[bz]	3.2±0.1[by]	3.7±0.1[ax]	4.4±0.1[bw]	5.8±0.1[av]
Carr	2.8±0.1[ay]	2.6±0.1[bz]	3.5±0.1[ax]	3.6±0.1[abx]	4.6±0.1[aw]	5.4±0.1[cv]
CSS	2.5±0.1[bcz]	2.7±0.1[bz]	3.2±0.1[by]	3.5±0.1[bx]	4.5±0.1[bw]	5.9±0.1[av]
WPC	2.5±0.1[bcz]	2.6±0.1[by]	3.4±0.1[aw]	3.1±0.1[dx]	4.1±0.1[cv]	5.6±0.1[bu]
ISP	2.6±0.1[bz]	2.9±0.1[ay]	3.2±0.1[bx]	3.3±0.1[cw]	4.3±0.1[bv]	5.8±0.1[au]

[a-d] Different superscripts in the same column indicate significantly different ($P<0.05$)
[u-z] Different superscripts in the same row indicate significantly different ($P<0.05$)

Table 4. Changes of pH value of chicken liver sausage with different binders during cold storage(4℃)

Treatments	Storage Time					
	0	4	7	14	21	28 (days)
Control	6.60±0.01[abx]	6.59±0.01[ax]	6.59±0.01[bx]	6.55±0.01[cy]	6.58±0.01[abcx]	6.55±0.01[ay]
Carr	6.61±0.01[abxy]	6.58±0.01[ayz]	6.63±0.01[ax]	6.60±0.01[aby]	6.56±0.01[cz]	6.55±0.01[az]
CSS	6.58±0.01[bx]	6.51±0.01[by]	6.57±0.01[bx]	6.58±0.01[bcx]	6.57±0.01[bcx]	6.52±0.01[by]
WPC	6.62±0.01[ax]	6.60±0.01[ax]	6.62±0.01[ax]	6.61±0.01[ax]	6.60±0.01[abx]	6.57±0.01[ay]
ISP	6.62±0.01[ax]	6.61±0.01[ax]	6.62±0.01[ax]	6.61±0.01[ax]	6.61±0.01[ax]	6.57±0.01[ay]

[a-c] Different superscripts in the same column indicate significantly different ($P<0.05$)
[x-z] Different superscripts in the same row indicate significantly different ($P<0.05$)

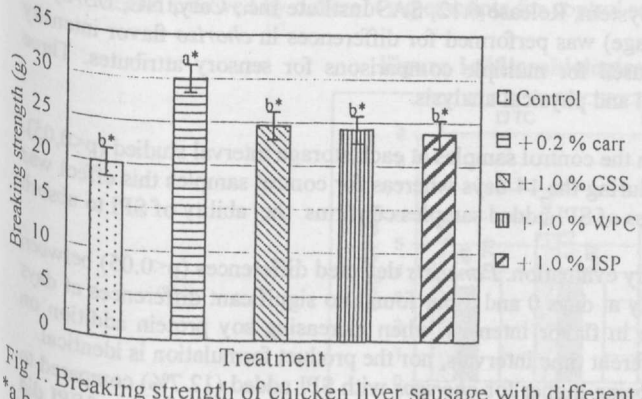

Fig 1. Breaking strength of chicken liver sausage with different binders
*a,b means without the same letters are significantly different($P<0.05$)

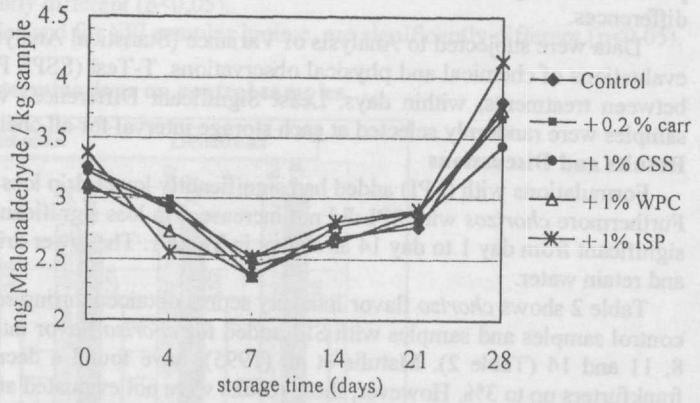

Fig 2. Changes of TBA-value of chicken liver sausage during cold storage (4℃)