

P-03-04**Effect of hydrolysate fractions derived from desalted duck egg white on the quality of pork chops during storage**

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Introduction

Ultrafiltration (UF) has a widely used and more efficient for protein desalination technique in food industry. Its largest area of desalt application is in the production of cheese (Mohammad *et al.*, 2012). It has been applied for desalination of salted duck egg white (Zhou *et al.*, 2015). In addition, UF is one of the most popular to separate protein hydrolysates and the enrichment of peptides with a specific molecular weight range. Therefore, the aim of the study was to evaluate the quality of fresh pork chop sprayed with two levels (100 & 150 mg/mL) of hydrolysate fraction Mw <10 kDa (F-IV) from desalted duck egg white under refrigerated conditions for 3 days.

Methods**Fractionation of protein hydrolysates**

Desalted egg white powder (DSEWP) was dissolved with RO water to obtain a final concentration of 150 mg/mL. Porcine pepsin was added to give an E/S ratio of 0.3% (w/v). The hydrolysis was performed by incubating at 37 °C for 9 h. The reaction was stopped by heating at 95 °C for 10 min to inactivate the enzyme and then centrifuged at 12,000 × g for 10 min at 4 °C and collected the supernatant of protein hydrolysates. The supernatant of protein hydrolysates was subjected to fractionation by using UF membranes 10 kDa molecular weight cut-off sequentially and obtained Fraction-IV (F-IV).

Application in pork chop

A total of 180 pieces 1 cm thickness of fresh pork chops was used and 3 pieces of pork chop were placed in a plastic tray and packed with aerobic film then divided into 5 treatments in this study. Five treatments: control: no treatment; Blank: sterile water; DSEWP: DSEWP solution at 150 mg/mL; F-IV100: F-IV at 100 mg/mL solution; or F-IV150: F-IV at 150 mg/mL solution. Solutions were separately sprayed on the surface of fresh pork chops and hold 5 mins then were wrapped with polyethylene film and stored at 10 °C for 3 days.

Determinative items

TBARS value, Total plate count, Lactic acid bacteria count, VBN and sensory were performed in this study.

Results**TBAS values**

The TBAR value of all pork chops increased significantly ($p < 0.05$) during storage time. Notably, TBAS value of pork chops with F-IV fractions were lower than that of control and other treatments. At the end of day 3, TBARS

value of the control increased from 0.16 to 0.35 mg MDA/kg, whereas the TBARS value of the pork chop sprayed with F-IV100 and F-IV150 fractions were 0.29 and 0.25 mg MDA/kg, respectively.

VBN values

VBN value of pork chops with five treatments were shown in Table 1. At the beginning of storage, the VBN value of all pork chops ranged from 3.95-4.70 mg% and there were no significant differences among groups ($p > 0.05$). The VBN values of all pork chops increased with storage time. As expected, the VBN value of pork chops with F-IV were lower than control, blank and DSEWP, but there were not significant differences at the end of day 3.

Microbial qualities

The TPC count of all groups were significantly increased during refrigerated storage ($p < 0.05$). The TPC count of control, blank and DSEWP were gradually increased and reached to 4.72, 4.85 and 4.65 log CFU/cm² separately at the end of storage. The use of F-IV fractions showed significantly ($p < 0.05$) inhibiting efficiency on the growth rate of TPC. The TPC count of F-IV100 and F-IV150 at the end of 3-day storage were 4.71 and 4.48 log CFU/cm², respectively. Especially, pork chop sprayed with F-IV at 150 mg/mL had remarkably ($p < 0.05$) lower TPC counts during storage period. The LAB counts samples increased during storage just the same, as expected. The LAB growth counts were also inhibited by the application of F-IV fraction, as shown in Table 1. The LAB count of control, blank and DSEWP samples showed a rapid increase during 3 days refrigerated storage. While, the F-IV100 and F-IV150 samples had significantly ($p < 0.05$) lower LAB counts than the control samples.

Sensory evaluation

No significant ($p > 0.05$) differences were found in color among all treatments and maintained stable during storage. The texture scores of all treatments showed increased as the increase of storage time. In change of off-odor, the scores of all treatments showed increased as the increase of storage time but pork chops with F-IV 100 and 150 exhibited lower off-odor scores. On the whole in flavor, no significant difference was observed among treatments during storage ($p > 0.05$) although pork chops with F-IV 100 and 150 had lower flavor score at the end of storage. In the change of overall acceptance, there was no significant difference ($p > 0.05$) among pork chops in all treatments. However, before 2 days of storage F-IV samples showed higher overall acceptability than the other treatments.

Notes

Conclusion

Utilization of F-IV fraction from SDEW hydrolysates in pork chops exactly showed lower TBARS, VBN values and microbial counts during the whole storage. However, pork chops with F-IV150 also exhibited higher sensory attributes compared with control before 2-days during storage.

Item	Treatment	Time of storage (day)			
		0	1	2	3
TBARS (mg MDA/kg)	Control	0.16±0.00 ^{Ac}	0.19±0.01 ^{Ac}	0.26±0.05 ^{Ab}	0.35±0.05 ^{Aa}
	Blank	0.15±0.01 ^{ABc}	0.16±0.01 ^{Cb}	0.29±0.05 ^{Ab}	0.35±0.02 ^{Aa}
	DSEWP	0.14±0.01 ^{Cc}	0.16±0.01 ^{Cc}	0.29±0.03 ^{Ab}	0.34±0.02 ^{Aa}
	F-IV100	0.16±0.01 ^{Ac}	0.17±0.01 ^{BCc}	0.21±0.00 ^{Bb}	0.29±0.05 ^{Ba}
	F-IV150	0.15±0.00 ^{Bd}	0.18±0.01 ^{ABc}	0.21±0.01 ^{Bb}	0.25±0.01 ^{Ca}
VBN (mg%)	Control	4.70±0.35 ^{Ab}	5.20±0.48 ^{Ab}	5.65±0.75 ^{Aab}	6.27±1.18 ^{Aa}
	Blank	4.81±0.64 ^{Ab}	5.20±0.65 ^{Ab}	5.52±0.75 ^{ABab}	6.17±0.55 ^{Aa}
	DSEWP	4.69±0.81 ^{Ab}	5.28±0.63 ^{Aab}	5.66±1.17 ^{Aab}	6.33±0.70 ^{Aa}
	F-IV100	4.13±1.18 ^{Ab}	4.54±0.64 ^{ABb}	4.64±0.74 ^{ABb}	5.84±0.27 ^{Aa}
	F-IV150	3.95±0.71 ^{Ab}	4.36±0.47 ^{Bb}	4.42±0.60 ^{Bb}	5.62±0.47 ^{Aa}
TPC Log CFU/cm ²	Control	4.10±0.10 ^{Ad}	4.42±0.08 ^{Ac}	4.60±0.05 ^{Ab}	4.72±0.07 ^{Ba}
	Blank	3.94±0.14 ^{Bd}	4.27±0.07 ^{Bc}	4.53±0.08 ^{Ab}	4.85±0.07 ^{Aa}
	DSEWP	3.97±0.13 ^{ABd}	4.23±0.12 ^{Bc}	4.46±0.10 ^{Ab}	4.65±0.09 ^{Ba}
	F-IV100	3.77±0.06 ^{Cd}	3.97±0.09 ^{Cc}	4.08±0.13 ^{Bb}	4.71±0.04 ^{Ba}
	F-IV150	3.67±0.06 ^{Cc}	3.73±0.10 ^{Dc}	3.95±0.22 ^{Bb}	4.48±0.09 ^{Ba}
LAB Log CFU/cm ²	Control	3.34±0.19 ^{Ad}	3.56±0.10 ^{Ac}	3.87±0.05 ^{Ab}	4.64±0.07 ^{Aa}
	Blank	3.22±0.05 ^{ABc}	3.42±0.06 ^{Bb}	3.54±0.03 ^{Bb}	4.56±0.19 ^{Aa}
	DSEWP	3.07±0.07 ^{Bd}	3.46±0.05 ^{ABc}	3.67±0.20 ^{Bb}	4.22±0.07 ^{Ba}
	F-IV100	3.11±0.18 ^{Bc}	3.30±0.05 ^{Cb}	3.63±0.05 ^{Ba}	3.72±0.14 ^{Ca}
	F-IV150	3.06±0.05 ^{Bc}	3.20±0.14 ^{Cb}	3.33±0.01 ^{3Cb}	3.61±0.05 ^{Ca}

Table 1. Changes of pH, TBARS, VBN values of pork chop sprayed with fraction-IV solutions during ref

Notes

Characteristic ¹	Treatment	Time of storage (day)			
		0	1	2	3
Color	Control	5.10±0.74 ^a	5.20±0.48 ^a	5.20±0.63 ^a	5.15±0.67 ^a
	Blank	5.20±0.79 ^a	5.10±0.88 ^a	5.20±0.63 ^a	5.00±0.47 ^a
	DSEWP	5.20±0.63 ^a	5.00±0.67 ^a	5.10±0.74 ^a	5.10±0.74 ^a
	F-IV100	5.10±0.74 ^a	5.10±0.57 ^a	5.10±0.57 ^a	5.00±0.67 ^a
	F-IV150	5.30±0.48 ^a	5.00±0.82 ^a	5.25±0.72 ^a	5.20±0.79 ^a
Texture	Control	4.70±0.95 ^b	4.80±0.92 ^b	5.60±0.70 ^{ab}	5.70±0.67 ^a
	Blank	4.45±1.30 ^b	4.90±1.20 ^b	5.30±0.67 ^a	5.35±0.67 ^a
	DSEWP	4.50±0.85 ^a	4.70±0.82 ^a	5.15±0.47 ^a	5.10±0.99 ^a
	F-IV100	4.50±0.53 ^a	5.00±1.25 ^a	5.60±0.52 ^a	5.20±1.14 ^a
	F-IV150	5.10±0.74 ^a	5.25±1.03 ^a	5.20±0.92 ^a	5.50±0.94 ^a
Off-odor ²	Control	1.20±0.42 ^a	1.45±0.50 ^a	1.50±0.53 ^a	1.60±0.52 ^a
	Blank	1.00±0.00 ^a	1.30±0.48 ^a	1.40±0.52 ^a	1.50±0.53 ^a
	DSEWP	1.00±0.00 ^a	1.20±0.42 ^a	1.20±0.42 ^a	1.30±0.48 ^a
	F-IV100	1.00±0.00 ^a	1.10±0.32 ^a	1.15±0.34 ^a	1.20±0.42 ^a
	F-IV150	1.00±0.00 ^a	1.10±0.32 ^a	1.10±0.32 ^a	1.20±0.42 ^a
Flavor	Control	4.70±1.06 ^a	4.90±1.10 ^a	5.30±0.48 ^a	5.30±0.48 ^a
	Blank	5.20±0.92 ^a	5.10±0.99 ^a	5.30±0.95 ^a	4.65±0.82 ^a
	DSEWP	4.80±0.42 ^b	5.30±0.48 ^{ab}	5.40±0.52 ^{ab}	4.60±0.84 ^a
	F-IV100	5.30±0.67 ^a	5.60±0.52 ^a	5.30±0.67 ^a	5.10±0.32 ^a
	F-IV150	5.15±0.47 ^a	5.60±0.70 ^a	5.30±0.48 ^a	4.95±1.07 ^a
Overall acceptance	Control	4.50±0.85 ^a	4.70±0.95 ^a	5.30±0.67 ^a	5.45±0.76 ^a
	Blank	4.85±0.78 ^a	5.15±0.82 ^a	5.55±0.50 ^a	4.90±0.52 ^a
	DSEWP	4.85±0.63 ^a	4.70±0.54 ^a	5.35±0.47 ^a	4.90±0.88 ^a
	F-IV100	4.95±0.50 ^a	5.50±0.85 ^a	5.30±0.54 ^a	4.90±0.70 ^a
	F-IV150	5.10±0.52 ^a	5.25±0.98 ^a	5.45±1.01 ^a	5.10±0.97 ^a

Table 2.
Changes of sensory attributes of pork chop with fraction-IV solutions during storage

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