

Evaluation of Enzyme Extract from Chicken Viscera as a Tenderizer on Spent Hen Breast

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Background

Meat tenderness is an important index for meat quality, thus many techniques have been developed for this purpose. For example mechanical- high pressure, electric stimulation, massage and tumbling, chemical- organic acid, sodium carbonate and enzymatic- aging-autolysis (calpain and calthispin), enzyme from vegetable: papain, bromelain, and ficin, enzyme from animal: pepsin, trypsin and chemotrypsin etc (Ockerman, 1983). Brawa et al. (1981) stated that spent hen treated by papain can improve its juiciness and tenderness but not the flavor and overall acceptance. Devitre and Cunningham (1985) reported that spent chickens were treated with papain, bromelain and ficin separately by intravenous injection before slaughtering and the tenderness and cooking loss of the samples but were improved only by the papain treatment. The tenderness and juiciness of turkey thigh also can be increased by addition of 0.05% papain into the marinade (Cunningham and Tiede, 1981). Not much information about enzymes derived from animal as a meat tenderizer can be found.

Objective

To evaluate a crude enzyme dehydrate from poultry viscera as a meat tenderizer on spent hen breast.

Methods

Preparation of crude enzyme dehydrate

Crude enzyme solution was prepared from poultry pancreas and duodenum of poultry slaughtering by-products and dehydrated by a freeze dryer for 72 hrs. The powder products were stored at 4°C for adding into spent hen breast as a meat tenderizer.

Treatment of spent hen breast

Spent hen breasts were obtained from egg laying hens which were raised for 72 weeks from a local poultry farm. A 0.2% (w/w) of crude enzyme dehydrate and 0.2% (w/w) commercial tenderizer was added to spent hen breast sticks (width x length x thickness 1x1x1 cm), separately and incubated at 10 °C for 12, 24, 36, 48, 60 and 72 hrs. The products muscle microstructure were observed using a Scanning Electron Microscopy. Samples also were cooked at 85°C until the central temperature of meat reached at 70°C. The Shear value and MFI (Myofibrillar fragment index) of the samples were determined in this study.

Results and discussions

The results of Table 1 indicated that the tenderness of spent hen breast can be improved by all treatments when compared to the control. The efficiency for improving of tenderness by crude enzyme dehydrate was similar to that of a commercial product. Furthermore, the shear value of spent hen breast reached a similar value to the sample utilizing commercial broilers when the samples with the enzyme treatment were incubated at 10°C for 72 hrs. MFI of all samples increased with incubating time at 10°C (Table 2). The microstructure of spent hen breast with enzyme treatment demonstrated the muscle fibrous structure is loosen and some fragments appeared with incubating time at 10 °C (Fig. 1).

Conclusions

A meat tenderizer can be manufactured by a crude enzyme dehydrate from poultry viscera according to the results of this study.

References

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Table 1 The shear value (g/cm²) of spent hen breast treated with crude enzyme dehydrate from poultry viscera and commercial tenderizer during incubation at 10°C.

Time (hr)	Without enzyme	0.2% crude enzyme dehydrate	0.2% commercial tenderizer
Fresh broiler breast	420.33		
Spent hen breast			
0	990.67		
12	878.50	811.33	844.33
24	823.00	771.33	788.00
36	797.00	678.00	707.33
48	777.00	660.33	665.50
60	704.56	469.17	472.33
72	665.50	432.33	442.11

Table 2 MFI (%) of spent hen breast treated with crude enzyme dehydrate from poultry viscera and commercial tenderizer during incubation at 10°C.

Time (hr)	Without enzyme	0.2% crude enzyme dehydrate	0.2% commercial tenderizer
Fresh broiler breast	40.63		
Spent hen breast			
0	47.14		
12	50.12	52.60	52.34
24	53.51	60.84	62.46
36	65.08	67.77	68.35
48	69.34	71.98	75.36
60	71.21	75.88	80.65
72	75.51	81.06	80.35

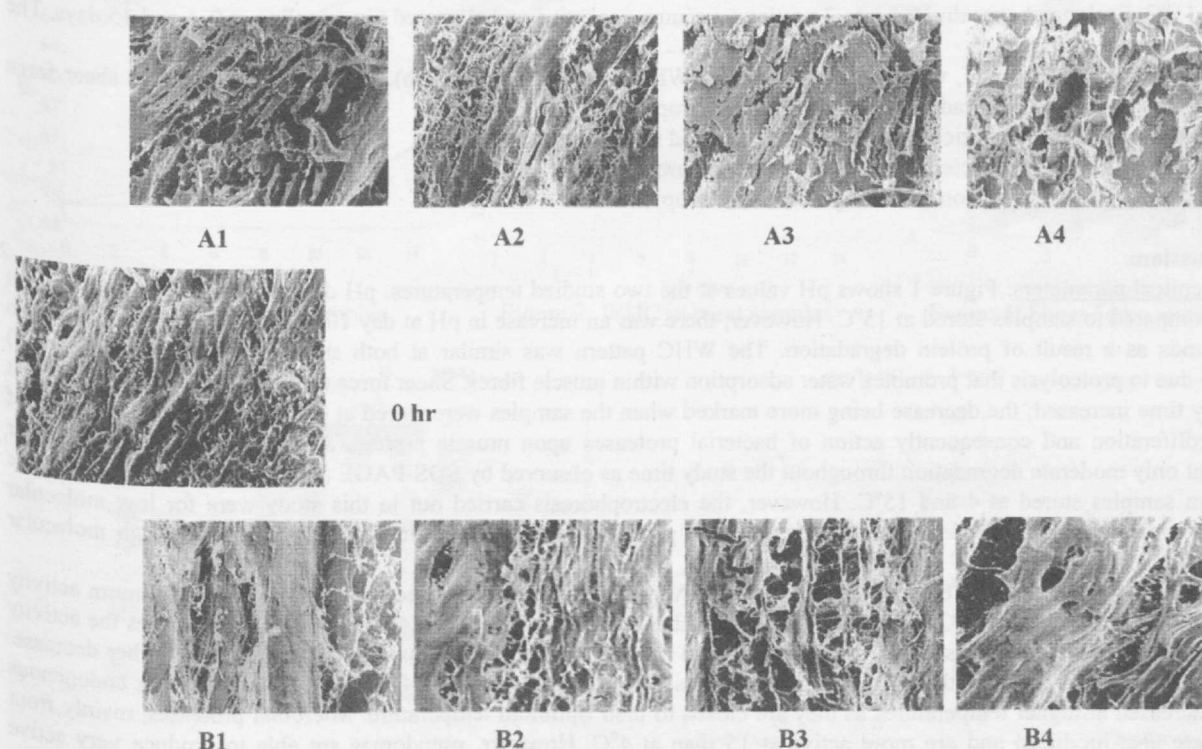


Figure 1 Microstructure of spent hen breast treated by 0.2% commercial tenderizer (A1: 12hrs, A2: 24hrs, A3: 48hrs and A4: 72hrs) and 0.2% crude enzyme dehydrate from poultry viscera (B1: 12hrs, B2: 24hrs, B3: 48hrs and B4: 72hrs) during incubation at 10°C.