Antioxidant Peptides in Commercial Dry-Cured Hams

A.S. Leaflet R3041

Chao-Zhi Zhu, Visiting Scientist, Nanjing Agricultural University;
Joseph G. Sebranek, Distinguished Professor, Department of Animal Science;
Dong U. Ahn, Professor, Department of Animal Science

Summary and Implications

Measurement of the antioxidant peptide content of six commercial dry-cured hams each from a different processor showed a wide range of peptide concentrations and antioxidant activity, but no clear association with processing variables such as drying and aging time, smoke application or cooking treatments. Thus, while the dry-curing process for hams has potential to result in significant production of antioxidant peptides, specific processing conditions considered in this study do not appear to affect production of these peptides.

Introduction

Dry-cured or country-cured hams are produced by a unique process of applying salt to intact hams followed by drying and aging of the hams for as long as 24 months. Enzymatic protein hydrolysis during the process has been shown to result in numerous short-chain peptides, some with antioxidant and antihypertensive properties. Because the dry-curing process varies widely among different processors in terms of salt content, aging time and heat treatments, it was hypothesized that processing conditions contribute to the formation of antioxidant peptides.

Materials and Methods

Eighteen commercial dry-cured hams were obtained from six processors. Hams were selected to represent curing and aging processes ranging from 3 months to 24 months and processing treatments including cooked, uncooked, smoked and unsmoked products. The *biceps femoris* muscle was removed from each ham when received and analyzed for salt content, peptide concentration, hydroxyl radical scavenging, 2,2-diphenyl-1-picrylhydrazyl radical scavenging, iron chelating activity and antioxidant impact on linoleic acid as measured by change in peroxide values during incubation at 37° C. Results were analyzed by analysis of variance (ANOVA) and Duncan's new multiple range test for significance.

Results and Discussion

Salt content (figure 1) of the hams ranged from 1.40% to 5.88% but there was no apparent relationship between salt content and drying and aging time, cooking or smoking treatments. The variable salt content most likely resulted from product formulation differences. Figure 2 shows the peptide concentrations observed with the greatest peptide production observed in ham 5, which also had the lowest salt content. Because salt inhibits muscle proteases, less proteolysis in the presence of greater salt concentration can be expected. This general relationship is also apparent for hams 1 and 6 with the rest intermediate for these measurements. Table 1 shows the results of the four different measures of antioxidant activity of the peptides that were extracted from the hams. Ham 1, a smoked, uncooked ham produced by a 9-month curing and aging process was consistently highest or second highest for all four of the antioxidant measurements conducted. Ham 1 also had a total peptide concentration among the highest in this study. However, ham 5 which was highest in peptide concentration was lowest in all the antioxidant activity measurements.

Thus, the total peptide concentration is not predictive of antioxidant activity in dry-cured hams. It is likely that the amino acid composition of specific peptides is more important to antioxidant activity than the peptide quantity, and will be determined in the next phase of this study.

Table. 1. Antioxidant activity of commercial dry-cured hams[1]

	DPPH radical scavenging activity (%)	OH radical scavenging activity (%)	Fe^{2+}-chelating activity (%)	Lipid peroxidation inhibition activity (%)
1	58.05±1.47[a]	38.84±1.40[a]	25.06±0.81[b]	15.21±1.54[a]
2	36.51±1.49[b]	32.00±1.44[b]	15.39±1.45[c]	9.50±1.26[b]
3	36.19±1.93[b]	27.57±1.01[c]	39.26±2.15[a]	9.23±2.18[b]
4	32.92±1.35[cd]	19.08±2.25[d]	13.07±0.42[d]	7.15±1.47[c]
5	30.83±3.13[d]	16.89±1.04[e]	7.14±1.02[e]	4.78±1.62[d]
6	33.99±1.41[c]	18.98±1.90[d]	14.94±1.10[c]	9.37±1.07[b]

[1] 1. Smoked, uncooked, 9-month process; 2. Smoked, uncooked, 3-month process; 3. Unsmoked, uncooked, 24-month process; 4. Unsmoked, uncooked, 9-month process; 5. Unsmoked, uncooked, 9-month process; 6. Unsmoked, cooked, boneless, 9-month process.

[a-e] Means in a column with different letters are significantly different ($P<0.05$)

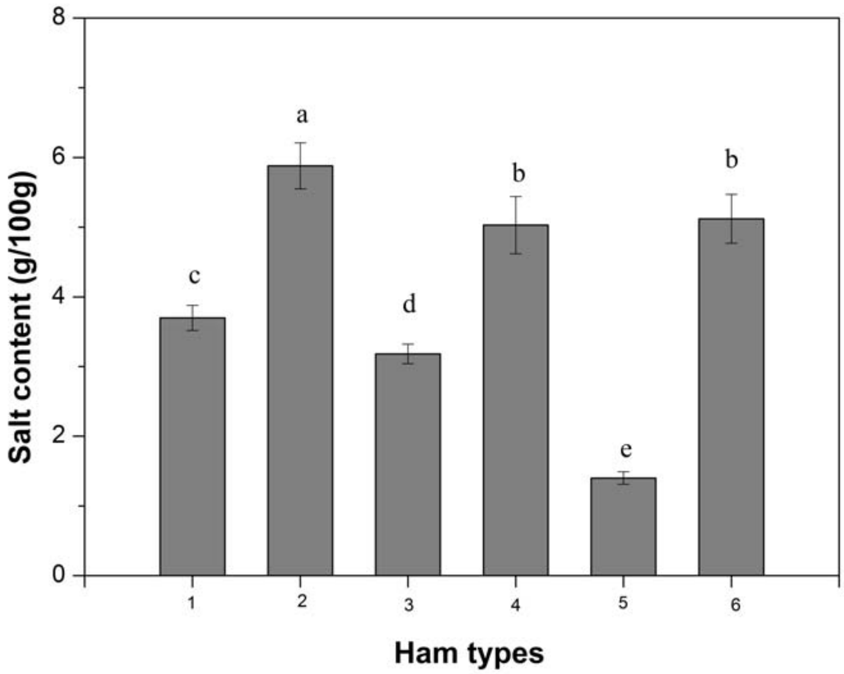

Figure 1. Salt content of commercial dry-hams.[1]

[1] 1. Smoked, uncooked, 9-month process; 2. Smoked, uncooked, 3-month process; 3. Unsmoked, uncooked, 24-month process; 4. Unsmoked, uncooked, 9-month process; 5. Unsmoked, uncooked, 9-month process; 6. Unsmoked, cooked, boneless, 9-month process.

[a-e] Bars with different letters are significantly different ($P<0.05$)

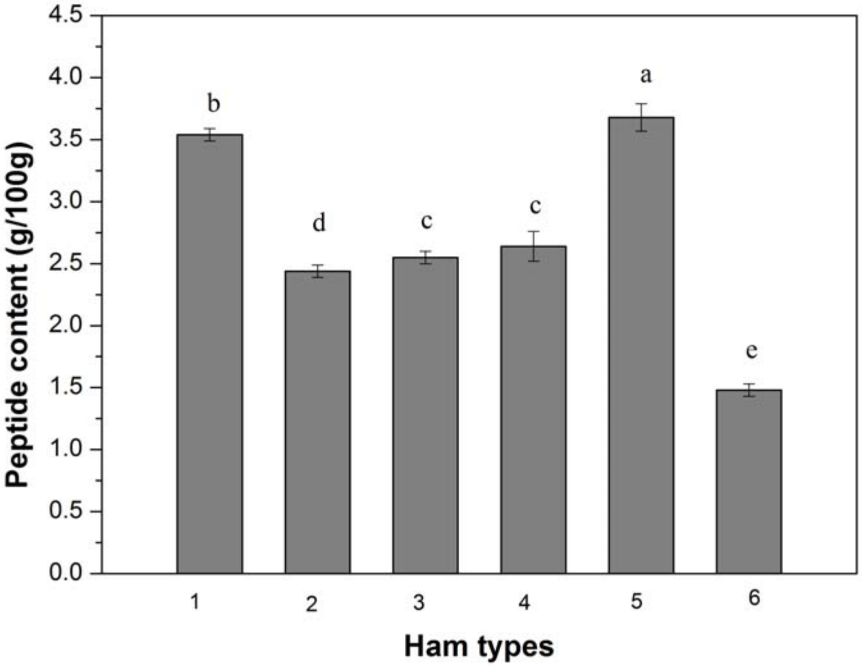

Figure 2. Peptide content of commercial dry-cured hams.[1]

[1] 1. Smoked, uncooked, 9-month process; 2. Smoked, uncooked, 3-month process; 3. Unsmoked, uncooked, 24-month process; 4. Unsmoked, uncooked, 9-month process; 5. Unsmoked, uncooked, 9-month process; 6. Unsmoked, cooked, boneless, 9-month process.

[a-e] Bars with different letters are significantly different ($P<0.05$)