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INFLUENCE OF DESINEWING AND PROCESSING ON THE AMINO ACID CONTENT OF BEEF SHANK

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SUMMARY

Desinewing of cattle, male shanks increased tryptophane, methionine, arginine, lysine and glutamic and aspartic acid contents, while the hydroxyproline, proline, glycine, and alanine contents were decreased. Curing as well as cooking showed no marked effect on the amino acid content.

INTRODUCTION

The relationship between collagenous and elastic tissue to tenderness in beef was investigated by Harrison et al.(1949), who found that tenderest roasts, in general, came from muscles and from animals having least connective tissues. Shank meat contains high amount of connective tissues which increase toughness and reduce the biological value of such meat (Sokolov et al,1960). According to Giffee et al, (1960), Pavlovski and Palmin (1963) the muscle tissues; connective tissue proteins are biologically incomplete. Collagen contains no tryptophane, cysteine and showed lower tyrosine and methionine contents. On the other hand, it contains higher percentages of hydroxyproline, proline, and hydroxylisine. Elastin, did not contain hydroxproline, while it contained cystine and lower amounts of arginine, lysine, glycine, glutamic and aspartic acids.

In as much connective tissue proteins showed lower biological vlaue; removing or diminshing their content i.e. desinewing, may raise the nutritional value of meat. At the same time desinewing is expected to enhance the meat tenderness. The meat, rich in connective tissues, is relatively tough. So, it is mostly used after grinding to over-come its toughness (Sokolov et al., 1960).

The object of this work was to study the influence of mechancial desinewing cooking and curing on the amino acid composition of the beef shank muscle tissues.

MATERIALS AND METHODS

A number of shank of cattle males about 18 months age were used in this work. Meat from 3 shank was ground using an electic meat mincer, having pores of 1.27 cm. Grinding was repeated, using a plate of 0.95 cm. The meat from the other 3 shanks was ground using a plate having pores of 0.22 cm, then mechanically desinewed, (Luwa -250). Desinewing head had pores of 0.19 cm. Curing was carried out by adding 130 ppm sodium nitrite plus 3% sodium chloride to both desinewed and intact meat. Parts of sinewing and desinewed meat were also stuffed in natural casing and heated to an internal temperature of 65°C for as long as 6 hrs.

The amino acid concentrations were determined using the paper chromatography methods as mentioned by Block et al., (1958). Total nitrogen content was determined according to the A.O.A.C. (1970). Amino acid contents were presented as mg/gm total nitrogen.

RESULTS AND DISCUSSION

Data presented in Table 1 shows the amino acid content in the different treatments. It could be noticed that intact raw shank meat contained low amounts of trypotophane, methionine, arginine, and lysine, being 50,171, 336 and 479 mg/gm nitrogen respectively. Sokolov et al., (1960) reported that the muscle tissues contained 118.8, 218.8, 450 and 487.5 mg/gm nitrogen for tryptophane, methionine, arginine, and lysine respectively. This may be due to the effect of high connective tissue in shank meat, which reduced the amounts of amino acids. Desinewing increased the ratio of tryptophane, methionine arginine, lysine, glutamic and aspartic acids. On the other hand, hydroxyproline, proline, glycine, and alanine were decreased by desinewing. Such conclusion might be expected as, Giffee et al.,(1960) and Pavlvoski and Palmin (1963), reported that connective tissues did not contain tryptophane, but only low amounts of methionine, arginine, lysine, glutamic and aspartic acids. Generally, it could be also noticed that desinewing increased the total content of the essential amino acids and subsequently the biological value was expected.

Cooking as well as curing seemeed to have no significant effect on the amino acid content.

Residues, on the other hand, contained relatively high amounts of hydroxyproline, glycine, and alanine, being 416, 984, and 507 mg/1 gm nitrogen respectively, while showed markedly low tryptophane content, being 28 mg/gm nitrogen. The finding pointed out, that the residues were mainly connective tissues rich in hydroxyproline, proline, glycine and alanine (Giffee et al., 1960) which are not of essential amino acids. Such residues could be used as additives for poultry and animal nutrition.

Desinewing in general finds a better use for shank meat which is usually referred to as a low priced meat, or used for gelatin production.

CONCLUSION

1.- Desinewing was expected to increase the biological value of shank meat, finding a better use for it.

2.- Using desinewing, the essential amino acids increased, while hydroxyprolin, proline, glycine and alanine contents decreased. Removing connective tissues increased tryptophane, methionine, arginine, lysine, glutamic and aspartic acid contents.

3.- The residues separated contained higher amounts of hydroxyproline, glycine and alanine, indicating that they were mainly composed of connective tissues. Such residues may be utilized for animal meal and poultry.

4.- Cooking as well as curing did not give significant change.

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Table 1.- The amino acid content in beef shank as affected by different treatments.

Amino acid content mg/gm. nitrogen	Desinewed			Intact			Residue
	Raw	Cooked	Cured	Raw	Cooked	Cured	
Valine	311	313	312	291	280	291	257
Leucine	481	478	478	441	445	449	322
Isoleucine	283	285	286	267	250	264	169
Therionine	243	241	247	224	249	229	160
Lysine	526	521	521	479	494	477	323
Methionine	199	162	176	171	189	159	61
Phenylalanine	448	435	444	432	418	423	289
Tryptophane	60	56	60	50	47	43	28
Hystidine	205	161	187	170	169	167	107
Arginine	343	274	289	336	354	335	378
Alanine	391	392	396	403	416	420	507
Glycine	405	403	418	527	519	543	984
Proline	303	299	309	363	565	364	579
Serine	201	195	208	190	234	197	180
Aspartic acid	572	568	565	556	552	557	478
Glutamic acid	967	955	965	907	929	924	738
Hydroxyproline	100	96	106	1169	183	178	416

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