4 - 35 AMINO ACID COMPOSITION OF SEVEN EGYPTIAN BEEF AND BUFFALO BY-PRODUCTS.

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Summary

The aim of this study was to evaluate both chemical and nutritional qualities of liver, heart, kidney, brain, tounge, spleen, and lung of beef and buffaloes by-products. The average age of the cows and buffaloes from which the samples were withdrawn was the normal commercial age (between 2-2.5 years).

The results revealed that high significant differences between organs of each animal were recorded in their indispensable amino acid composition except that of leucine, while there were significant differences between organs in methionine and isoleucine.

There were no significant differences between animals in their indispensable amino acid composition except that of isoleacine and valine.

Leucine, occurs in studied organs in remarkable higher concentration than any of the other indispensable amino acids in beef and buffalo organs.

Lysine, is present in high concentrations in beef and buffalo organs.

Methionine and tryptophan occur in rather low concentration in beef and buffalo organs.

Introduction

During the past several years studies have been conducted to determine the amino acid composition of fresh and cooked pork, beef and lamb muscle cuts and processed meat as well. These studies have now been extended to beef and buffalo organ meats. In the present study the levels of leucine, isoleucine, phenylalanine, valine, methionine, threonine, arginine, histidine, lysine, and tryptophan in beef and buffalo liver, heart, kidney, brain, tongue, spleen, and lung, have been determined.

Karan-Durdic, (1976), studied the amino acids composition and nutritional value of various beef and pork organs, namely: Liver, Kidney, Heart, Brain and Lungs.

Skrabka-Blotnicka and Maskas. (1976), found that pig spleen and liver contained less protein than the corresponding beef or calf organs, but there were no noticable differences in amino acid composition.

Saad-El-Din, (1979), reported the amino acid composition of male camel's heart during green season.

In addition, several authors (Beach, 1943. A, Stokes, 1945. c, Schweigert, 1945, Lymun, 1946, c, and McCance and Widdowson, s (1978). reported the average values of essential amino acids composition in various beef organs. The aim of this study was to evaluate both chemical and nutritional qualities of liver, heart, kidney, brain, tounge, spleen and lung of beef and buffaloes by-product.

Materials and Methods

a- Materials:

Three representative samples from each of the specified beef and buffalo organs, namely: Liver, Heart, Kidney, Brain, Tongue, Spleen, and Lung, were obtained immediately after slaughtering from Assiut a battoir .

The average age of the cows and buffaloes from which the samples were withdrawn was the normal commercial age (between 2-2.5 years.).

b- Methods:

Quantitative and qualitative determination of essential amino acids were determined using paper chromatography technique according to Block, et al. (1958) and Youssef (1962).

Tryptophan content was determined colorimetricaly using the method described by Spices and Dorris, (1948).

Results and Discussion

In the present study the amounts of leucine, isoleucine, phenylalanine, valine, methionine, threonine, arginine, histidine, lysine, and tryptophan in beef and buffalo liver, heart, kidney, brain, tongue, spleen and lung, have been determined.

The results obtained are tabulated in Table (1-2). Such data were further analysed statistically and results were presented in Table (3).

The present study shows that leucine, occurs in studied organs in remarkable higher concentration than any of the other indispensable amino acids, i.e., 10.35 to 12.31; 10.35 to 11.83 percent in beef and buffalo organs, respectively; (except in the case of beef tongue which contain 11.06 percent of lysine).

Likewise, lysine, a dietary essential, is present in high concentrations, 7.68 to 11.06; 6.57 to 10.24 percent in beef and buffalo organs, respectively. On the contrary, methionine and tryptophan occur in rather low concentrations; 1.16 to 1.51 and 0.86 to 1.40; 1.12 to 1.55 and 0.86 to 1.32 percent in beef and buffalo, respectively.

On the other hand, valine, isoleucine, threonine, arginine, histidine and phenylalainine, have relatively similar concentrations varying from 2.79 to 3.74, 2.29 to 2.95, 2.35 to 2.92, 1.81 to 2.70, 2.14 to 2.96 and 3.01 to 3.80, 3.09 to 3.93, 2.65 to 3.31, 2.20 to 2.78, 2.05 to 2.68, 2.14 to 3.07 and 2.94 to 3.62 percent, in studied beef and buffalo organs, respectively.

An over all at table (3) indicated that there were highly significant differences in the amino acid content (Phe, Val, Thre, Arg, His, Lys, Trp.) and significant differences in isoleucine and methionine between organs, while there were no significant differences in amino acid leucine between organs. Such data indicated that highly significant differences in amino acid isoleucine and valine between beef and buffalo, but there were no statistically significant differences in amino acid leucine, phenylalanine, methionine, threonine, arginine, histidine and lysine between beef and buffalo. However, the interaction between the organs and animals in phenylalanin and valine were highly significant, while there were no significant differences in the interaction between organs and animals of other amino acid.

According to (Beach, et al., 1943) larger differences in amino acid composition were found among the beef organs than among the muscle proteins of different species, as would be expected from their higher concentration of nuclear material and different functional activities. In addition to an evaluation of the relative dietary values of the animal proteins in terms of ten specific amino acids, the data demonstrate the amino acid pattern to which animal muscle must conform in the synthesis of tissue protein.

Schweigert, et al. (1953), found that leucine, valine, methionine and possibly threonine were higher in liver protein and several of the amino acid were lower in spleen and lung protein.

Olson (1970), found that almost all of the by-product tissue, except blood, were low in the essential amino acid tryptophan, when compared to the standard, whole egg protein. Although, he does not discuss the methionine content of the various by-product tissue, from his data is would seem that all tissues were low in methionine, when compared to whole egg protein, (Satterlee and

Table (1): Indispensable amino acids composition of beef organs (g/100 g protein).*

Organs	Isoleucine	Leucine	Phenylalanine	Valine	Methionine	Threonine	Arginine	Histidine	Lysine	Tryptophan
Liver	2.61^{ab}	12.26^{a}	3.52^{ab}	3.74^{a}	1.51^{a}	2.43^{bc}	2.13^{b}	2.56^{abc}	7.68^{b}	1.15^{c}
Heart	2.75^{ab}	12.31^{a}	3.32^{bc}	3.06^{d}	1.34^{ab}	2.49^{bc}	2.57^{a}	2.72^{ab}	8.26^{b}	0.86^{d}
Kidney	2.43^{ab}	11.78^{a}	2.87^{d}	3.07^{d}	1.32^{ab}	2.70^{ab}	2.39^{ab}	2.47^{bc}	8.39^{b}	0.92^{d}
Brain	2.39^{ab}	10.35^{a}	3.17^{cd}	3.16^{d}	1.29^{ab}	2.82^{a}	2.70^{a}	2.39^{bc}	7.72^{b}	1.28^{b}
Tongue	2.95^{a}	12.06^{a}	3.80^{a}	2.79^{e}	1.16^{b}	2.47^{bc}	2.66^{a}	2.96^{a}	11.06^{a}	1.40^{a}
Spleen	2.32^{b}	10.57^{a}	3.01^{cd}	3.48^{b}	1.38^{ab}	2.92^{a}	1.81^{c}	2.14^{c}	7.88^{b}	0.91^{d}
Lung	2.29^{b}	11.31^{a}	3.24^{bc}	3.33^{c}	1.30^{ab}	2.35^{c}	2.27^{ab}	2.22^{c}	8.25^{b}	0.89^{d}

* a,b,c,d,e : Symbols indicating the result of dunken test.

Table (2): Indispensable amino acids composition of buffalo organs (g/100 g protein).*

Organs	Isoleucine	Leucine	Phenylalanine	Valine	Methionine	Threonine	Arginine	Histidine	Lysine	Tryptophan
Liver	3.15^{ab}	11.46^{a}	3.22^{bc}	3.93^{a}	1.55^{a}	2.78^{a}	2.07^{b}	2.14^{b}	6.93^{c}	1.08^{b}
Heart	3.31^{a}	10.76^{a}	2.94^{c}	3.46^{b}	1.25^{b}	2.58^{a}	2.29^{ab}	2.60^{b}	8.22^{bc}	0.86^{c}
Kidney	3.01^{ab}	10.95^{a}	3.12^{bc}	3.16^{cd}	1.29^{b}	2.49^{a}	2.11^{b}	2.51^{b}	7.75^{bc}	1.03^{b}
Brain	2.90^{ab}	11.83^{a}	3.62^{a}	3.09^{d}	1.20^{b}	2.69^{a}	2.68^{a}	2.53^{b}	9.31^{ab}	1.32^{a}
Tongue	3.25^{a}	11.35^{a}	3.38^{ab}	3.23^{cd}	1.12^{b}	2.64^{a}	2.44^{ab}	3.07^{a}	10.24^{a}	1.31^{a}
Spleen	2.73^{ab}	10.35^{a}	3.21^{bc}	3.53^{b}	1.34^{ab}	2.76^{a}	2.26^{ab}	2.19^{b}	6.57^{c}	1.07^{b}
Lung	2.65^{b}	11.72^{a}	3.38^{ab}	3.27^{c}	1.19^{b}	2.20^{b}	2.05^{b}	2.47^{b}	8.21^{bc}	0.98^{b}

* a,b,c,d : Symbols indicating the result of dunken test.

Table (3): Analysis of variance of data given in table (1-2).

S.V.	D.F	M.S.									
		Isoleucine	Leucine	Phenylalanine	Valine	Methionine	Threonine	Arginine	Histidine	Lysine	Tryptophan
Between organs A	6	0.3598*	1.3079	0.2495**	0.476**	0.0874*	0.1926**	0.3613**	0.4508**	7.7822**	0.212**
Between kind of animal B	1	2.2820**	1.0590	0.0008	0.230**	0.0282	0.0004	0.8869	0.0006	0.8715	0.009
A x B	6	0.0170	1.4862	0.1855**	0.064**	0.0030	0.0664	0.1005	0.0726	1.3229	0.012
Error	28	0.1042	1.3962	0.0465	0.017	0.0249	0.0325	0.0671	0.0756	1.0479	0.005

S.V. = Source of variance. D.F. = Degrees of freedum.

* = Significant. M.S. = Mean of squares.

** = Highly significant.

The amino acid composition of beef heart, liver, kidney and brain was found to differ from each other (Vuyst, et al., 1975).

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