# SUPPLEMENTATION OF OFFAL PROTEINS BY AMINO ACIDS OR OTHER PROTEIN SOURCES

By

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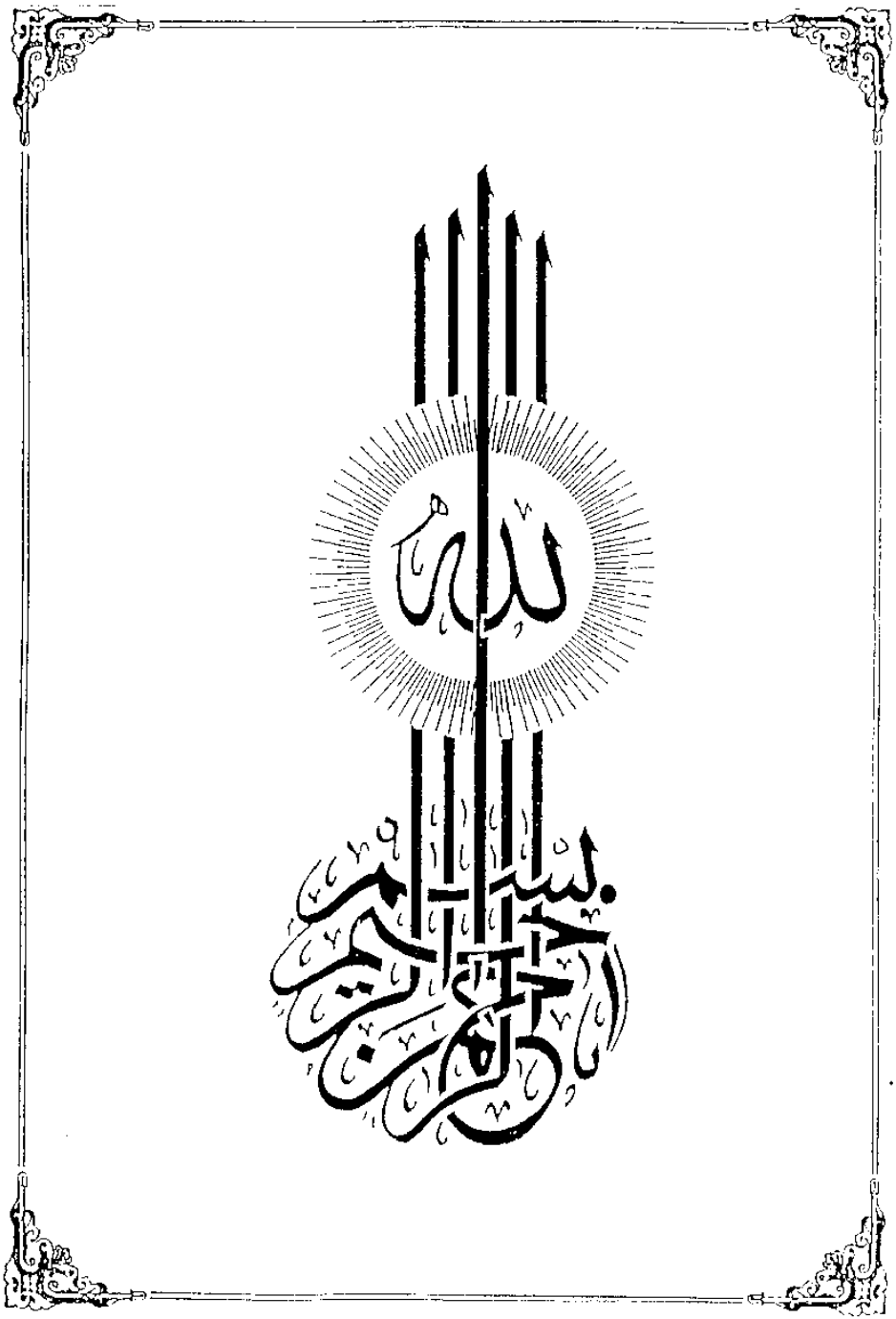


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# I N T R O D U C T I O N

The food habits of a nation determine the nutritional level and health of people; kind, quality, and amount of food are involved. People everywhere tend to develop patterns of eating. these patterns still into fixed habits. Ultimatly the food habits of a country, good or poor, furnish presumptive evidence of its population. Recognising patterns of eating and appreciating their significance, therefore, provides a base line for approaching nutrition and processes involved in nutritional education.

Everyone eats certain foods and refuse others for many different reasons. Culture and group influnces determine what foods are eaten. Meal patterns, number and method of eating.

In the Daily American Magasine, Rome, Sunday-Monday 22-23 October (1972), under the title of " Offal Good", Rome's Unique Cuisine; dishes based on innards by Charles Robertriello: "Few cities can offer one or two unique dishes that can be eaten nowhere else in the world. Rome is among them ..... All innarrds should be eaten as soon after butchering as possible". Egypt also offers offals in many places for all people especially those of poor economic, social and educational status.

There is no part in the world in which every one gets the right amounts of the right kind of food. In the 20th century, as at the beginning of human history, this problem remains. It will

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be only removed when the world wide application of the knowledge and skill of modern science brings to all people the food, quantity, and quality they need.

Meat make an important contribution to the diet as an excellent source of protein, fatty acids, and certain minerals and vitamines; and defined as the flesh of animals used as food. A secondary source of meat, however, is the edible offals (viscera) which constitute a considerable portion (20%) of the carcass weight.

Offals are always looked upon as a second or even a third class quality kind of meat in the public opinion, and consequently, sold in cheeper price for the poor people. Shehata and Hamza (1978) concluded that protein efficiency ratio of different edible offal protein sources, except legs, ranged from 1.35 to 1.72 as compared to 1.75 of meat. Results concerning legs as a source of protein indicate the incapability of their protein to promote tissue growth due to the incompletness of such protein regarding the essential amino acids and needs, therefore, supplements by other protein sources or by the dificit amino acids recommended. Although the PER's and BV's of meat and edible offal parts are not high as egg protein, they are particularly well suited to supplement to proteins drived from cereals, legumes and other vegetables.

The main objective of the present work is to determine the nutritional value of offal proteins-supplemented with animal, plant

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protein, and the most deficit essential amino acids- using the chemical methods and experimental animals; also to establish amino acid patterns of the different individual parts of the edible offal proteins.

Biological evaluations of the supplemented offal proteins involved determination of chemical score based on amino acid analysis, available lysine values (ALV), protein effeciency ratios (PER), feed efficiency ratios (FER), and net protein utilization (NPU) by analysing the rat carcass.

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## I- Review Of Literature

### I-A- Essential and non-essential or indispensable and dispensable amino acids :

Until recently, the knowledge of the requirement for the amino acids in the diet was limited to information obtained with the young rats. These animals were able to grow when recieving only nine amino acids: namely, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, thrionine, tryptophan, and valine; and grow significantly better when arginine was also provided. These ten amino acids were called "indispensable" for the growing rats, while the remaining known amino acids were called "dispensable", (Rose 1938); also he defined an indispensable amino acid as one which can not be synthesized in the body at a rate sufficiently rapid to promote normal growth. Dispensable amino acids are: alanine, asparatic acid, citruline, cystine, glutamic acid, glycine, hydroxyproline, noreleucine, proline, hydroxyglutamic acid, serine and tyrosine.

The most recent analysis of body tissue show that, particularly, all of the dispensable amino acids are present. These amino acids may comprise 40 % or more of the tissue proteins. It is obvious that the "dispensable" amino acids are physiologically indispensable to the formation of the characteristic protiens of the animal. Lack of any one of the essential amino acids in the diet produces negative N-Balance, stops repletion and causes the animal to loose appetite and to fall ill.

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Data presented in table (1), shows that all species require all the essential amino acids. Only histidine does not seem to be necessary for adult human. Masset and Gatewood (1954), however, pointed out that the apparent nonessentiality of histidine tothe adult human male as reported by Rose et al (1951) may be associated with the relative short feeding perio ds used by the investigators, and with the possibility that humans utilize histidine drived from degredation of haemoglobin.

It can be also seen that the maintenance requirements as suggested by Leverton (1959) for women are somewhat lawer than those given by Rose (1957) for men, both on the basis of the total daily amount per Kg bodyweight. Leverton (1959), however, pointed that this may be related to differences between the techniques used. In the experiments with women, the quantities of amino acids determined were those which are necessary to keep the experimental persons in nitrogen equlibrium. For men, however, the requirements have been based on the highest amounts needed by any subject for a slight but distinctly positive nitrogen balance. These differences may explain the lower values amino acids requirements recorded for women compared with men.

Mitchell (1959) concluded that the cystine-methionine re-

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Table(1) Requirements of Indispensable Amino Acids for Different Species

| Amino Acids | Maintenance | | | | Maintenance+Growth | |
|---|---|---|---|---|---|---|
| | Adult Rats | | Women | Men | Young Rats | Infants |
| | Rasset(1957) mg / day per Kg 3/4 | Michell (1959) mg/day | Leverton (1959) g /day | Rose (1957) g / day | Almquist (1959) % of diet | Albanese (1950) Tryptophan equal 1 |
| Arginine | - | 21.90 | - | - | 0.20 | - |
| Glycine | - | - | - | - | - | - |
| Histidine | 6.70 | 7.80 | - | - | 0.40 | - |
| Isoleucine | 30.0 | 20.80 | 0.45 | 0.70 | 0.50 | 3.00 |
| Leucine | 16.0 | 34.30 | 0.62 | 1.10 | 0.80 | 14.00 |
| Lysine | 3.60 | 11.20 | 0.50 | 0.80 | 1.00 | 5.60 |
| Methionine | 40.00 | 19.10 | 0.55 | 1.10 | 0.40 | 2.80 |
| Phenylalanine | 18.00 | 40.30 | 0.22 | 1.10 | 0.70 | 5.60 |
| Threonine | 20.00 | 12.20 | 0.31 | 0.50 | 0.50 | 2.90 |
| Tryptophan | 4.40 | 5.60 | 0.16 | 0.25 | 0.20 | 1.00 |
| Valine | 18.00 | 23.60 | 0.65 | 0.80 | 0.70 | 5.40 |

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quirement is relatively more intense for the adult rat than for either the growing rat or for the adult human. On the other hand, the lysine requirement seems to be much less prominent among the amino acid requirements of the adult rat than among those of the adult man.

B- The reference amino acid pattern :

The FAO provisional amino acid pattern is given in table (2), together with that of egg protein. It differs in various ways from the pattern of the protein of high nutritive value. as was intended, the publication of this pattern stimulated research to assess its efficacy both in human and experimental animals. There are advantages in adopting the essential amino acid pattern of whole hen's egg, the reference pattern. Egg has a biological value comparable to that of breast milk and is almost completely digested when fed to children, adults, and experimental animals under appropriate conditions. Moreover, it is completely utilized in experimental animals when fed at maintenance level. Egg protein can be easily fed to persons of all ages in experiments where the reference essential amino acid pattern from a natural source is a necessary control.

Accordingly, the essential amino acid pattern of whole hen's

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e/... as given in table (2) has been adopted for reference purposes. while the evidence available indicates that the reference essential amino acid pattern as given in table (2) represents the optimum pattern for the growing child and probably for the adults as well, it can not be assumed without further tests that it is optimal for all physiological and pathological states, (FAC/WHO 1965). The problem of variations in the essential amino acid pattern that may be needed in different circumstances is quite distinct from the question of differences in the optimum E/T ratio, although the two problems are closely related. The new method of expressing reference essential amino acid pattern makes it much easier to treat these two questions separately, it should be also more convenient for interpreting imbalances and for evaluating the amounts of limiting amino acids needed to improve proteins of poor quality, (FAC/WHO 1965).

C- Amino acid imbalances :

The possible effect of amino acid imbalance must be taken into account in any evaluation of the essential amino acid pattern of foods and in planning supplementation. One type of amino acid imbalance arises when addition of a single amino acid or mixture of amino acids to a diet reduces the utilization of the dietary protein. Even a small increase in the concentrations of certain

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