Biochemical Analysis of Edible Brain

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Degree of Master of Science

BY

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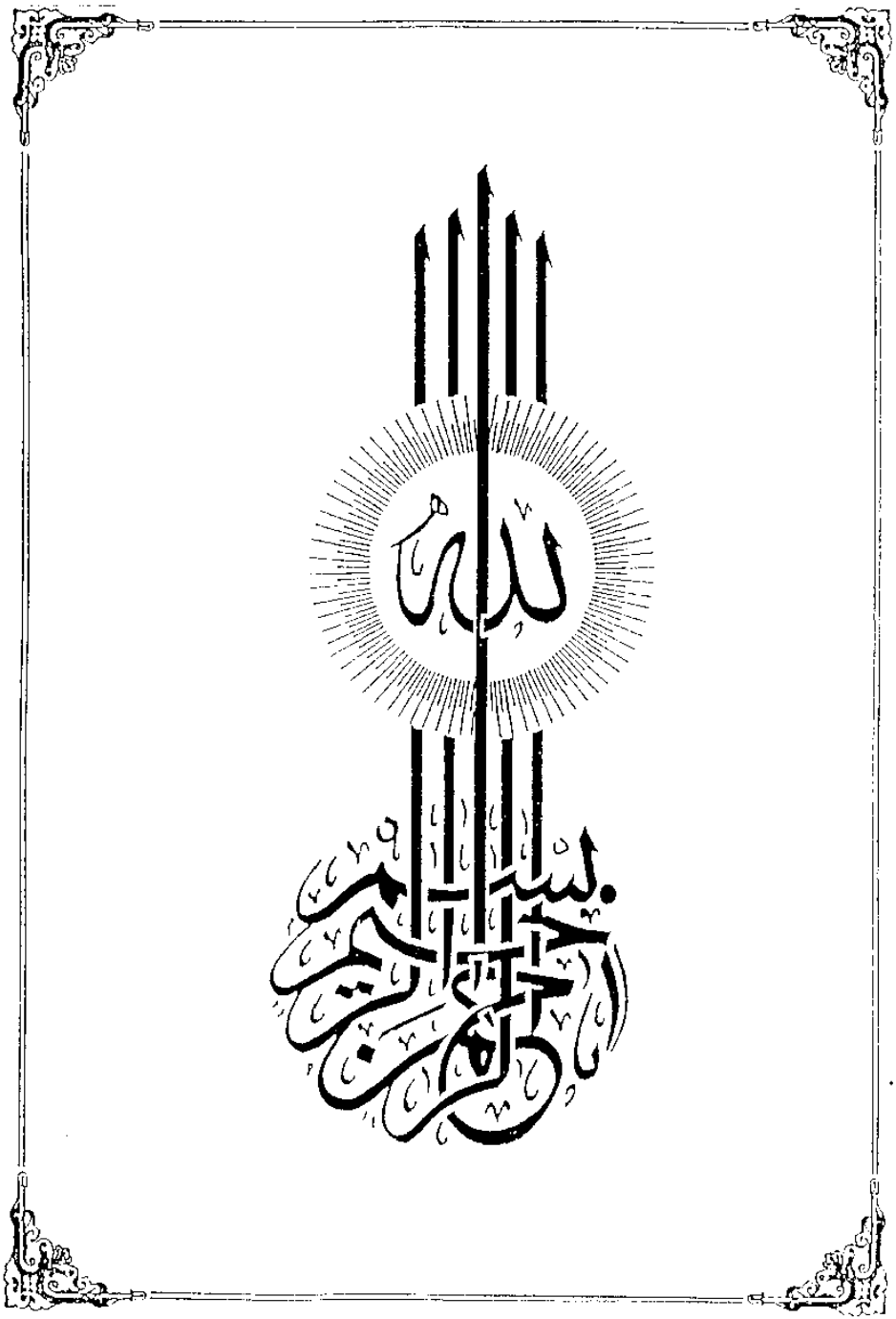

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PART I

INTRODUCTION AND AIM OF THE WORK

Foods are the materials which are needed by the living system.

Health and well being are impossible without a good diet satisfactory both in quality and quantity. Such an adequate diet is needed for all living mechanisms, such as growth, reproduction, reperation, maintenance and resistance to diseases. Foods include also the materials which supply the living machine by energy requried for work and heat production.

Proteins are among the components of diet that play an important role in the maintenance of good nutritional status. Good quality proteins are in short supply and unevenly distributed, hence the incidence of protein malnutrition is accordingly high in most developing countries.

The problem of protein needs is the most complex in the field of nutrition and its defficieney causes many diseases specialy among children because of the growing body requirements. The protein requirement represents a need not only for total nitrogen but also for the essential amino-acids which cannot be synthesized

in the body.

Meats are the most important sources of animal proteins. They have High biological value as their amino acids are biologically complete (Ashbrook, I956). They also provide the body with inorganic constituents and some vitamins.

The majority of animals (other than poultry) that slaughtered in all countries for human consumption consists of cattle, calves, sheep, and pigs. In Egypt camels are also included among these animals.

According to the Census of the Minstry of Agriculture Vet. Departemet (I966), camel meat represents I3.I5 %of the total amount of meat consumed by the puplic of Egypt. Cattle meat , representing 62.7 % of the total meat production, is considered the major source of meat in Egypt (Ghoneim et al, I957).

Animal protein intake percapitum in Egypt as showed by the F. A. O. (I96I), is only I3 grams per day, compared with standard requirements of 54 grams per caput per day of protein of NPU of 65 %, or 35.I6 grams per caput per day of reference protein (F.A.O. , W.H.O.,I965).

In developed countries the daily consumption of total protein is 90 grams per person of which 44 grams are animal protein, while in the developing countries the total protein consumption is 58 grams per person per day of which only 9 grams are animal proteins (milk, meat, eggs and fish)(Davidson and Passmore, I97I).

In Egypt the animal meat consumption exeeds I95 thousand tons, while the total production is about I50 tons only (Ghoneim et al I963).

Abd el Rahman (I966) showed that, in Egypt, there is a deficiency of 20-30 thousand tons in the output of meat. So live animals, mainly cattles and sheep as well as frozen meat are imported. This importation is a drain on the hard currency resources of the country.

The number and weight of slaughtered animals in Egypt during I974 according to the data obtained from the Ministry of Agriculture,Vet. Department, I975 are shown in table (I).

Table (1): Number, body weight and meat weight of animals slaughtered in Egypt during the year 1974 .

Animals	Number	Animal body weight(Kg.)	Animal meat weight (Kg.)	Total meat weight (Kg.)
Local :				
Ox	1019	400-450	250	254750
Cow	32053	350-400	200	6410600
Buffalo	88837	400-500	300	16651100
Veal (Vetello)	196869	60-70	40	7874760
Ox(Agaly)	131692	300-350	180	23704560
Cow(Agaly)	365369	300	165	27402675
Sheep	348640	40	20	6972800
Imported:				
Camel	64145	400-450	250	16036250
Ox	5295	350-400	250	1481250
Sheep	22897	40	20	457940

Brain is one of the animal byproducts and can be considered as a nutritionally rich meal . It is commonly used as a main protein dish an in sandwitches for outdoor meals and snacks .

Brain tissue is a favorable diet for the heamoglobin regeneration in severe animia. Whipple and Robscheit (1927) found that, under controled conditions, 200 - 300 grams of cooked brain per day caused an increase of 20 - 25 grams of heamoglobin in two weeks. This reaction was not comparable with the enormous increase during heavy feeding with liver or kidney .

Besides, Herberlandt in (1931) showed that feeding raw cerebral cortex or its extract induced greater activity in giunea pigs isolated in individual cages than in controls.

Also dried brain was found to be able to bring about healing in rickets and was recommended for this purpose, (Hess, 1927) .

So it was the purpose of this work to find out more information about the biochemical composition and

protein biological value of brain of the main Egyptian slaughtered animals. These animals, include Buffaloes, cows, sheep, and camels.

The present work includes both qualitative and quantitative determinations of certain organic and inorganic physiological constituents of brain.

The effect of age and sex on these constituents were also investigated.

Brain proteins were subjected to hydrolysis for the determinationof the different amino acids constituents both qualitatively and quantitatively.

Besides these, brain proteins of the different investigated species were evaluated biologically by determining both the net protein utilization value and protein efficiency ratio.

PART II

REVIEW OF LITERATURE

Review of Literature

Using Albino rats on IO % protein diets for periods of 3C and 60 days, Hoagland and Snider (I926), showed that veal, ox, and hog brains, ox and hog tongues, ox spleen and dried milk have practically the same nutritive value.

Mitchel and Beadless (I927) reviewed the protein value of beef liver, beef heart and beef kidney. These values were, 74, 77, and 77 respectively and significantly exceed those of pork meat and beef meat (74 and 69 respectively).

The biological value of muscle meat proteins of cow, buffalo and goat was studied by Mitra and Mittra (I945). The following data were found at IO %level of protein intake; cow 68.6, buffalo 59.5, and goat 60.4.

At I5 % level of protein the corresponding values were 53.7, 46.4 and 46.7. The difference between the values for buffalo meat and goat was significant at both levels.

At IO % protein level the B.V. of beef meat was significantly superior to that of either buffalo meat

or goat meat, but at I5 % level the superiority of beef was not significant.

Block (I937) reported that the amino acids of male and female primate neuroproteins were approximately the same except for lysine which was present in an avarage molecular ratio of lysine to arginine of I00-83 in males and I00:93 in females.

He also reported that the molecular ratio of lysine to arginine in human neuroproteins remaine constant through life, at the same time less histidine was present in the neuroproteins of young males than in those of adults.

Kudinov and Sokhina (I967) isolated the protein from the brain of cattles by electrophoretic fractionation. I7 amino acids were determined in this protein. Most of the dicarboxylic amino acids were found in the amide form and the ratio of basic amino acids to those containing free carboxylic groups was I.49.

Lysine was preponderant among basic amino acids. The protein contained only small amounts of cystein and methionine.