SUPPLEMENTING EFFECT OF PROTEINS AND AMINO ACIDS IN COMMON FOODS ON THEIR NUTRITIVE VALUE

THESIS

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSPHY

"AGRICULTURAL SCIENCES"

Animal Nutrition

BY

REFAAT TAHA AHMED

M.Sc (Agric) AIN SHAMS UNIVERSITY

TO

FACULTY OF AGRICULTURE

AIN SHAMS UNIVERSITY

ANIMAL PRODUCTION

1983

APPROVAL SHEET

Title of Thesis : Supplementing Effect of protein and amino Acids in common foods on their nutritive value.

Degree : Ph. D. (Animal Production)
(Nutrition)

Name of Student : Refaat Tada Ahmed

This thesis for the Ph.D. Degree has been approved by :

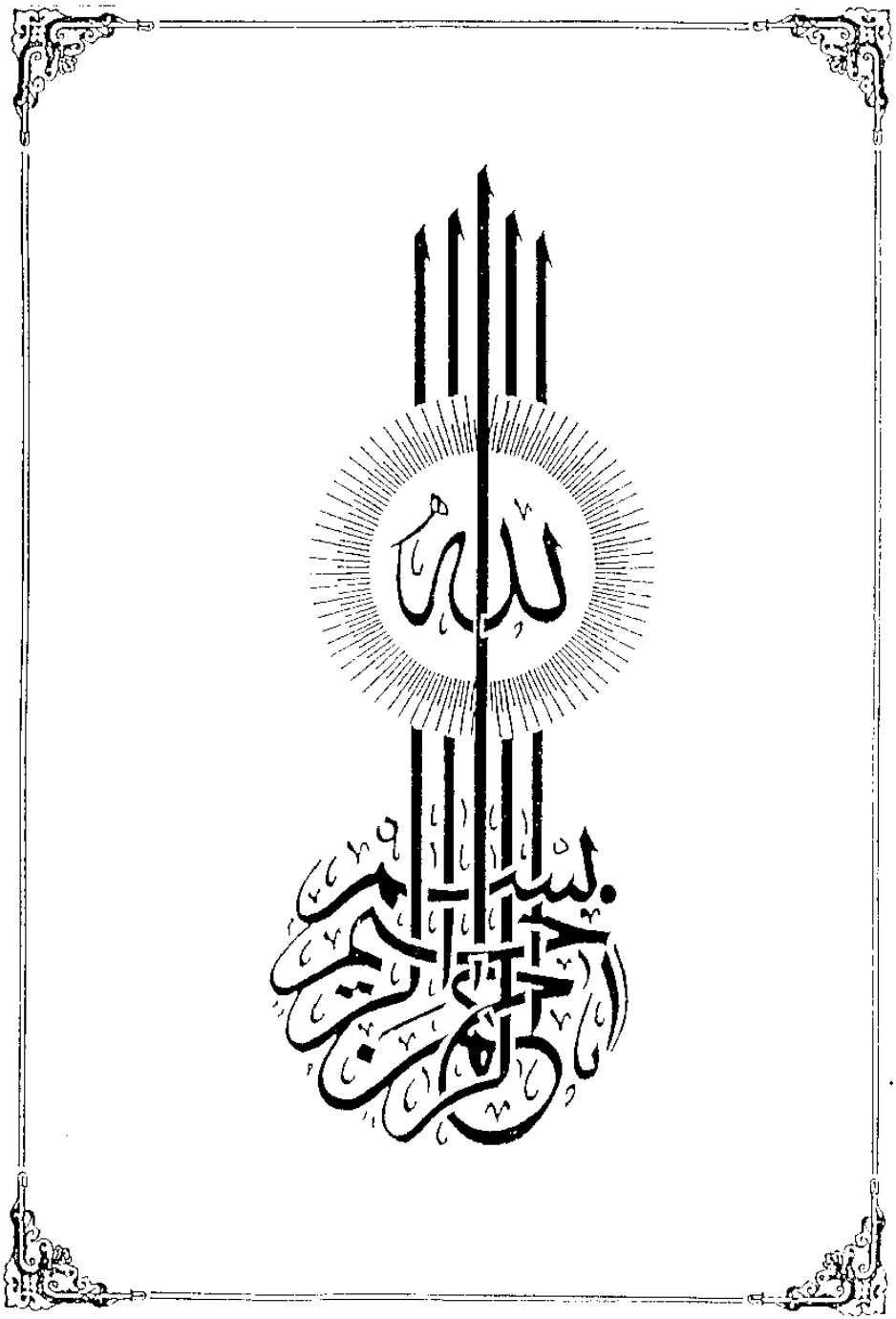
Prof Dr. : .....

Prof Dr. : .....

Prof Dr. : .....

Committee in charge

Date : 2 / 6 / 1983



ACKNOWLEDGEMENT

I would like to express my sincere gratitude and indebtedness to the late Dr. Osman Shenata professor of animal nutrition, Department of animal production, Faculty of Agriculture, Ain Shams University, who in addition to suggesting the subject of this dissertation, supported me constantly with his valuable advice and guidance through out every work step, God bless his soul.

I also wish to acknowledge my deepest thanks to Dr. Mohamed A. El-Ashry professor of Animal Nutrition, Department of Animal production, Faculty of Agriculture, Ain Shams University, for his great help, continuous encouragement and precious advice through out the whole work.

I am deeply obliged to Dr. Sabry. R. Morcos, professor of food science and nutrition, Head of Department, National Research Centre, for his continuous guidance, encouragement and kind support in accomplishment of this study.

My deep thanks and sincere appreciation and special gratitude also to Dr. El Sayed. M. Hegazi professor of Nutition, Nutrition Department, National Research Centre for his valuable help, constant, precious advice and tremendous assistance through the course of this study.

I am equally grateful to prof. Dr. Gamal N. Gebrial professor of the Food Science and Nutrition Department, National Research Centre for his great support and valuable advice.

I would also like to thank Dr. Amin I. Abdou, Assoc. Prof. of agricultural economics, Agricultural Economics Laboratory, National Research Centre, for his cordial help in the statistical analysis for the study.

My sincere appreciation and deepest gratitude to all the staff members of Nutrition Dept., National Research Centre, as well as the staff members of the Animal Production Dept Faculty of Agriculture, Ain Shams University for their substantial encouragement in finalysing this work.

REFAAT T. AHMED

CONTENTS

8888888

Introduction

Nowadays the developing countries are facing so many problems from the population expansion. The most serious part of these problems is to raise the animal protein consumption percaput to the adequate standard level. In spite of the tremendous efforts devoted now to increase the animal protein production, the amount is still less to cope with the population increase.

This situation necessitates that more scientific care should be given to plant proteins, which if given with a suitable supplement may decrease considerably the need for animal protein. Efforts have to be concentrated on takleing the problem in two ways : through increasing food production on one hand , and through improving the existing food resources, on the other.

How do we best employ the protein sources we have now and will have in the future?

This study introduces some efforts mostly directed to improve the protein quality of the staple foods being consumed daily. Bread of common use of Egypt as well as two common dishes namely stewed bean and koshari were selected to increase the efficiency of their protein utilization. Fortification

with high protein, high lysine commodities in a minimum amounts to improve the efficiency of these diets was applied.

Through such fortification, the amino acid deficiencies can be corrected in amounts appropriate to bring the pattern to the level required by the individuals. The second approach by fortification with high quality proteins in addittion with synthetic amino acids in amounts to correct the amino acid deficiency. The third approach is to combine protein sources so that they will mutually balance each other's deficiencies or excesses which is known as protein complemenaton.

Chemical and biological evaluations for the fortified diets were undertaken to judge the effectivness of such fortification by rich protein sources of plant origin or with synthetic amino acids to compensate the deficiency of lysine; the first limiting amino acid in wheat and corn flours and tryptophan in corn flour as well as methionine in beans.

REVIEW OF LITERATURE

State of nutrition in Egypt:

Egypt, as any developing country, is confronted with economic and social problems. These are reflected on the health of nutritional status of the population particularly the vulnerable groups; including infants and young children (Morcos, 1966).

Morcos (1966) reviewed the state of nutrition in Egypt and reported that the Egyptian diet is mainly composed of cereals and it is low in foods of animal origin. The quantity of food as estimated from the Food Balances Sheet, theoretically meets the requirements of the population. However, he pointed out that :

1. A large proportion of dietary protein is from plant sources, supplied by cereals.
2. Imbalanced distribution of food among families is mainly due to variation in socio-economic standards. Moreover, there is imbalanced distribution of food among members of the same family. The head of the family gets more animal protein foods than the other members who need these foods such as children, pregnant and lactating mothers.
3. The increase in population greatly exceeds food production,

Thus, it is expected that the problem will become complicated by time unless measures will be taken to increase food production to make it equal to the population increase or exceeds it.

4. Lack of nutrition knowledge particularly that concerned with infant and child feeding.

A comparison of the daily food supplies for human consumption percaput as given by the Food Balance sheets compiled by the Ministry of Agriculture, Cairo, Egypt, in the years 1968 and 1980 is presented in table (1). It also shows that cereals are the staple food mainly wheat and rice. It shows an increase of 48 gms (or 7.7%) in 1980, also the percaput supply of starchy foods, sugar and sugar syrups in 1980 was more than in 1968. The individual daily supply of fresh vegetables, fruits and vegetable oils were slightly higher in 1980 than in 1968. This induced more caloric supply for percaput in 1980 by about 13%. There was a moderate increase in the percaput daily supply of other food items except for milk and dairy products. This resulted in increasing the individual animal protein supply by 4.2 gm per day. An overall increase in daily percaput supply of total protein by 11.4 gm accured due to increased supply of cereals and milk.

The increase in food and nutrient supply occured in period (1968 - 1980) is mainly due to the government

Table (1) : Average daily [illegible] per [illegible] in Egypt. (Ministry of [illegible] 1968 and 1980);

Item	1968	1980
Cereals	620	668
Starchy foods	19	53
Sugar + sugar syrups	64	74
Pulses, nuts & seeds	22	21
Vegetables & seeds	249	316
Fruits	137	157
Vegetable oils	16	23
Meat	27	34
Fish	8	12
Eggs	4	5
Milk & Milk products	120	202
Total food intake	1276	1565
Calories	2344	3390
Total protein	84.2	95.6
Animal protein	10.3	14.5

policy that aimed at increasing production and importation of various foods. With especial reference to the major protein sources, table (2) shows that imports constituted a high percentage of domestic consumption (1980). About 79% of wheat human consumption was supplied through importation. Also imports of dairy products shared 57% of its bulk of consumption. On the other hand about 92% of lentils consumption needs had to be imported.

Table (3) provides information on the importance of various food groups and the average of world daily intake percaput of each. It is evident that cereals are highly consumed and they supply 49.71% and 45.35 % of total energy and protein intake respectively. Wheat, rice and corn are the staple Foods being consumed daily.

The average daily intake percaput of total animal protein is 34.73%.

Comparing such data with these given in table (1) one can assume that the nutrition problem facing us in Egypt is primarily an overall lack of protein intake especially those from animal origin. Efforts have to be concentrated mainly on attacking the problem in two directions, through improving and increasing food production on one hand, and through improve the use of existing resources on the other.

Table : (2) : Production, importation , and consumption of major protein sources (1000 M.t) and protein per caput intake (gm/day) for Egypt (1980)*.

Item	production	Importation	Human consumption)	Protein intake
Cereals	8914	5550	11815	68.2
Wheat	1826	4912	6168	39.0
maize	2938	916	2857	16.9
rice	2511	-	2242	6.6
Legumes	323	99	332	4.5
broad bean	224	30	187	2.8
lentils	8	57	62	0.7
Total animal origin	2560	1325	2850	14.5
red meat	336	81	412	3.8
white meat	136	56	192	1.5
fish	143	48	173	1.2
eggs	80	2	70	0.6
milk & milk products	1865	1138	2003	7.4

* Ministry of Agriculture 1980.