5. SUMMARY

This study was conducted to product of some food in protein concentrate and isolate from products three legumes, (sweet lupin, chickpea and common bean).

In some foods:

Pan bread: product (wheat flour 72% extraction adding protein concentrate replacement 10, 20 and 30%) in sweet lupin, chickpea and common bean was higher and improve nutritional value of pan bread.

Common bean milk: product (protein concentrate of common bean: water) was requirement of milk in Egypt.

Yoghurt: product (milk common bean : milk bafflue) was higher of nutritional value of yoghurt.

Beef burger: product (protein isolate from sweet lupin, chickpea and common bean replacement 10, 20 and 30%), after good mixing of components each treatment divided to pieces each of them weight 50 gm approximately and then form it into discs. The propose of this process to make lower coast economic product of beef burger which provides high price of meat at time last.

The study of chemical composition of raw materials were used.

- Microbiological study of meat used of beef burger, include total bacterial count, *E. coli* and *Salmonella* spp.
- Rheological study of dough of pan bread product.
- Sensory tests for end product.

- Biological tests of pan bread and beef burger.
- Statistical analysis for obtained results.

The obtained results could be summarized in the following:

1- **General characteristics of sweet lupin seeds flours, chickpea seeds flour, common bean seeds flour, protein concentrate and protein isolate:**

A) Chemical composition:

i. Chemical analysis of all raw materials used for product of pan bread common bean milk and beef burger. The highest moisture, fat, fiber and carbohydrates were recorded for used while the highest protein and ash were recorded for protein concentrate and protein isolate.

ii. Highest protein was found for NaOH and HCl treatment.

iii. Protein concentrate and protein isolate was also highest protein while is lower in moisture, fat, fiber and carbohydrate ohydrates.

iv. The effect of addition of (10, 20 and 30%) to the source rich in mineral contents such as potassium, sodium and calcium, while addition of highest contents of manganes.

v. The antinutritional factors from (phytic acid — tannins — trypsin inhibitor —alkaloids) were lower percentage value in determination of raw materials flour were used.

B) Amino acids composition:

i. No deficiency was found in essential amino acids from sweet lupin or chickpea or common bean untreated, protein concentrate and protein isolate, while its three legumes are riches in essential amino acids.

ii. The confirmed results were both glutamic acid asprtic the predominant in sweet lupin, chickpea and common bean.

iii. The results of amino acids in preparation pan bread (10%, 20% and 30%), the methionine and cystime first limiting amino acids, the isoleucine was second limiting amino acid and in both sweet lupin, chickpea and common bean.

iv. NaOH, HCl treatment showed mostly highest concentration of each of the individual essential amino acid.

v. Protein concentrate is suggested to be utilized as partial wheat flour substitute during production of pan bread, milk and yoghurt.

C) **Functional properties of sweet lupin seeds flour, chickpea seeds flour and common bean seeds flour:**

i. **The** minimum solubility of protein seeds flour at pH 4.5, while highest increased and decreased pH degree were becomes very highest for was alkaline pH 9.

ii. The results showed the water absorption was high, while low oil absorption.

iii. The emulsification capacity (EC) increased as the pH value increased, showing maximum value at pH 9.0.

iv. The highest foam capacity (FC) was at maximum acidity, while it was the lowest at pH 4.5. On the contrary the highest foam capacity stability was at pH 9.0.

v. Highest of protein percent, fat, vitamin B_1, vitamin $B2$ in common bean milk and yoghurt.

D) Utilization of protein concentrate from sweet lupin, chickpea and common bean:

1- Pan bread:

i. The highest of protein concentrate and ash, observed increased of protein content, while lower content moisture, fat, fiber and carbohydrates, two the highest protein concentrate, observed increase content of ash.

ii. The addition of protein concentrate from sweet lupin, chickpea, common bean replacement (10, 20 and 30%) product of pan bread markedly increased the mineral contents such as iron, manganes. zinc, sodium, calcium, potassium and phosphorus.

iii. Highest percentage absorption of water on Farinograph in all blends, Arrival time and dough development time increased except for chemical blend no changed. Dough stability decreased in natural blend. This increase may be due to the low fiber content.

iv. Highest of elasticity in all blends, decreased extensibility in all blends, therefore lower of fiber decrease of proportional number in all blends and highest respecting dough energy the data indicated that dough energy.

v. Highest of protein concentrate in pan bread dough possibly improved is nutritional value, highest of percentage from amino acid (Aspartic acid, Methionine, Thrionine, Serine, Glutamic acid, Proline, Glycine, Alanine, Cysteine, Valine, Isoleucine, Leucine, Phenyl alanine, Histidine, Lysine, Argnine).

vi. Highest of protein concentrate, observed highest of protein content in pan bread which provide lower grams of consumption in pan bread.

vii. Color of pan bread was not affected by the addition of protein concentrate at any level up to 30%.

viii. Aroma, taste and overall acceptability, while non significant ($p < 0.05$) difference was control, samples of pan bread from preparation with protein concentrate for 20% level.

ix. The results of organoleptic scores indicated that it is enough to replace 20% protein concentrate of wheat flour, while non significant ($p < 0.05$) difference was control, to obtain pan bread with maximum sensory characteristics.

2- Common bean milk: product of addition protein concentrate into water, observation highest of percentage protein, fat, vitamin B_1 and vitamin B_2.

3- Yoghurt common bean milk: addition common bean milk: Buffalo milk percentage 1 common bean milk : 10 Buffalo milk were product yoghurt common bean milk, observation highest two in percentage of protein, fat, vitamin B_1 and vitamin B_2.

E) <u>Utilization of protein isolate from sweet lupin, chickpea and common bean in product beef burger:</u>

i. Observation from protein content in beef burger highest, result adding protein isolate, two non significant ($p < 0.05$) difference were obtained results.

ii. Lower content moisture, fat and highest content ash, carbohydrates, while changed in content of fiber, when used protein isolate in beef burger.

iii. The addition of percentage protein isolate, highest product fried burgers, while lower loss with fried shrinkage, indicating that protein isolate favoured the physical characteristics of food.

iv. Aroma, taste and overall acceptability were the same for control as well as for fried beef burgers with protein isolate up to 20%.

v. The result of organoleptic scores indicated that it is enough to replace 20% of beef burger with equal proportion of diluted protein isolate to obtain beef burg with maximum sensory characteristics.

vi. Biological evaluation for both the pan bread and beef burger, after evaluation blends rheological. The experimental used 120 albino rats (with average weight 70-75gm), rats were feeding on pan bread and beef burger were without in compared with control. The rats were divided into five groups (each of them contain five rats) and feeding on pan bread with replacement parentage 10, 20 and 30% of sweet lupin seeds protein concentrate chickpea protein seeds concentrates and common bean protein concentrate. Also, the replaceme4nt was done with sweet lupin seeds protein isolates, chickpea seeds protein isolate and common bean protein isolate in the whet flour.

vii. Processing of pan bread by adducing sweet lupin protein concentrate, chickpea protein isolate and common bean

- protein isolate into flour 75% extraction and product of pan bread replacement percentage 10, 20 and 30% obtained of results improvement in true protein digestibility (T.D.), too biological value (B.V.) and net protein utilization in all treatments.

viii. From the obvious results, the end improvement in values (T.D., B.V. and N.P.U.), in case of adding sweet lupin seeds protein concentrate, chickpea seeds protein concentrate and common bean seeds protein concentrate, however, this incensement and the improvement did not very highest values of (B.V., N.P.U) greater than 50%.

ix. Deficiency of amino acid lysine in wheat flour product of the pan bread, also, deficiency of amino acids (methionin — cysteine — isolucine) in the mentioned three legumes. On the other hand, un case of beef burger product there are improvement in sensory evaluation and all constituents due to adding protein isolates from the mentioned three legumes. Meanwhile, T.D., B.V. and N.P.U. were similar to values of control sample. Data were revealed non-significant differences at $P < 0.05$.

From the obtained results we can summarized the following recommendations:

1. Addition of 10, 20 and 30% from sweet lupin seeds protein concentrate, chickpea seeds protein concentrate and common bean seeds protein concentrate to wheat flour 72% extraction to produce pan bread for improvement the nutritional value of pan bread.

2. Using of common bean seeds protein concentrate to produce milk and yoghurt or added to milk by manufacturing percentage to satisfied the deficiency in milk production in Egypt.
3. We can use protein isolate by 10, 20 and 30% from sweet lupin seeds, chickpea seeds and common bean seeds to produce beef burger by replacement with beef. On the other hand, there were minimizing economical costs for beef burger production in Egypt.