SUMMARY

The research at hand was carried out to study possibility of fortifying some kinds of bread with wheat gluten, corn gluten casein at the levels 2,4 and 6% on one hand, and defatted soy at the levels 5,10 and 15% on the other . The results can be summered up as follows.

1) Chemical composition of wheat flour , corn flour corn gluten, wheat gluten , casein and defatted soy fluor.

The chemical analysis showed that wheat flour (72% extraction) contained 11.1% moisture, 11.4% protein , 0.78% fat, 0.7% fibre, 0.55 ash and 75.47 carbohydrates wheat flour 82% extraction contemned 11.7% masiture, 12.6% protein 1.3% fat , 1.1% fibre, 0.92% ash , and 72.38 carbohydrates, corn flour contained 10.9% moisture , 8.9% protein , 3.5% fat, 2.9% fibre, 1.5% ash and 72.3% carbohydrates. Corn gluten contained 10.2% moisture, 60% protein, 4% fat, 6.1 fibre, 5.2% ash and 14.5% carbohydrates. Wheat gluten contained 9.5% moisture, 74% protein 1.9% fat , 0.3% fibre , 0.6% ash and 13.7% carbohydrates casein contained 10% moisture, 85% protein, 0.5% fat, 0% fibre, 3.5% ash and 1% carbohydrates. Defatted soy flour contained 10.3% moisture, 42% protein, 3.5% fat, 6.5% fibre, 3.95% ash and 33.75 carbohydrates.

2) Determination of amino acid content of wheat gluten , corn gluten casein and defatted soy flour.

Analysis of amino acids in wheat gluten, corn gluten , casein and defeated soy flour showed that these sources contained both

essential and non - essential amino acids. They also showed an increase of lysine content in casein and defatted soy flour where as methionine and casein decreased in defatted soy flour.

3) Rheological properties :

3-1 Farinogarph test .

Wheat flour , wheat gluten , corn gluten , casein and defatted soy flour. The results showed that wheat flour (72% extraction) absorbed less water than wheat flour (82% extraction) and wheat flour (82% extraction mixed with corn flour). In the there cases water absorption was higher than control for the following reasons:

a) the increase in protein content on adding the supplementing substances that are rich in protein which, in turn, helps in increasing the absorption of water.

b) Increasing fibre led to more water absorption on adding corn flour defatted soy flour.

c) Defatted soy flour contained numerous polar side chains along with their peptide backbone thus making protein hydrophilic consequently the protein absorbed water and often retain water in final food products there by keeping these products fresh for longer time. Mixing time and dough development time lasted longer in wheat flour (82%) extraction and mixed flour 82% extraction) then wheat flour (72% extraction) the there kinds of flour were supplemented with wheat gluten, corn gluten , casein and defatted soy flour. Dough stability decreased in wheat flour (82% extraction) and mixed flour compared with 72%. the decrease is due to the fact that gluten

quality in wheat flour 72% extraction is higher than of wheat flour 82%. However , dough stability decreased at all addition levels in both wheat flour (82% extraction) and wheat flour (82% extraction) mixed with corn flour as compared with wheat flour 72% extraction. Dough weakening increased at the addition of defatted soy flour , corn gluten and casein while it decreased in all cases at the addition of wheat gluten.

3-2 Extensograph test .

the results indicated that extensibility and resistance to extension in wheat flour 82% extraction and wheat flour 82% extraction mixed with 20% corn gluten decreased compared with wheat flour 72% extraction . The addition of wheat gluten increased both the extensibility, resistance to extension and energy in all cases. On the other hand the effect of corn gluten , casein and defatted soy flour on extensibility and resistance to extension were not the same in all cases. However the results showed that these additions led to decrease in energy at all addition levels.

4- Organolyptic evaluation.

4-1 Organolyptic evaluation of pan bread.

At the addition of wheat gluten , casein and defatted soy flour to pan bread , the results were as follows :

The best technological addition was that of wheat gluten at level 4% . At the second rank, came casein. On the contrary the addition of corn gluten and defatted soy flour affected negatively the organolyptic properties of pan bread produced.

4-2 Organolyptic evalvation of balady bread.

On adding wheat gluten , corn gluten , casein and defatted soy flour, the results showed that the best addition was that of wheat gluten at level 2% though 4% is a bit technologically better. However, 2% is preferred from an economic point of view. Casein at level 2% came second . On the other hand, defatted soy flour can only be used at level 5% since it doesn't affect bread properties. on the contrary, the addition of corn gluten at any level affected negatively balady bread properties.

4-3 Organolyptic evaluation of balady bread (wheat flour 82% extraction mixed with 20% corn flour).

On adding wheat gluten , corn gluten, casein and defatted soy flour to balady bread (wheat flour 82% extraction mixed with corn flour 20%) the results were as follows:

The best result was the addition of wheat gluten at level 6%. The other addition negatively affected the organolyptic properties of balady bread mentioned above.

5) Chemical compastion.

5-1 Chemical composition of pan bread.

The results manifested that the content of protein, crude fat, crude fibre and ash increased as a result of adding wheat gluten corn gluten, casein and defatted soy flour.

5-2 The results showed that the protein content increased to 13.37, 14.85 and 16.33% on adding wheat gluten at levels 2,4 and 6% respectively as compared with control 11.89% the addition of corn

gluten increased protein content to 13.09 , 14.29 and 15.94% at the levels 2,4 and 6% compared with control 11.89% casein recorded 13.59 , 15.29 and 16.99% compared with control 11.89%. Also defatted soy flour increased to 13.99 , 16.99 and 18.19 compared with control 11.89% .

5-3 Chemical compastion of balady bread.

The result showed that the content of protein, crud fat , crud fibre and ash increased as result of adding wheat gluten, corn gluten, casein and defatted soy flour protein content increased to 14.54 , 16.05 and 17.53% an adding wheat gluten at level 2,4 and 6% respectively compared with control 13.09. The addition of corn gluten increased protein content to 14.29 , 15.49 and 16.69% at the level 2,4 and 6% compared with control 13.085% casein addition recorded 14.79 , 16.49 and 18.19% compared addition recorded to 15.19 , 17.29 and 19.39 compared with control 13.085%

5.4 Chemical composition of balady bread (wheat flour 82% + 20% corn flour).

The results indicated that the content of protein , crud fat crude fibre and ash increased as result of adding wheat gluten, corn gluten, casein and defatted soy flour protein increased to 13.68 , 15.16 and 16.64% an adding wheat gluten at level 2, 4 and 6% respectively compared with control 12.2. The addition of corn gluten increased protein content to 13.4 , 14.6 and 15.8% compared with control 12.2%, casein addition recorded 13.9 , 15.6 and 17.3% compared with control 12.2% . Also defatted soy flour addition recorded 14.3 , 16.4 and

18.5% compared with control 12.2%. Amino acid content of pan bread , balady bread and balady bread (wheat flour 82% extraction mixed with corn flour 20%).

6- The results showed that amino acid content increased on adding wheat gluten, corn gluten , casein and defatted flour. lysine recorded the highest increase at the addition casein and defatted soy flour.

Chemical score .

The results showed that lysine was the first limiting amino acid in pan bread , balady bread, and balady bread (wheat flour 82% extraction mixed with corn flour 20%) It was also the first limiting acid in control of the three kinds of bread.

Biological value .

Balady bread was fortified with plant and animal sources rich with protein. These sources are :

1- Corn gluten	60% protein
2- Wheat gluten	74% protein
3- Defatted soy flour	42% protein
4- Casein	85% protein

Balady bread was supplemented with these sources:

On at a time at levels 2, 4 and 6%. Defatted soy flour was used at levels 5, 10 , 15% .

One hundred thirty five weanling male albino rate (Spragve) Dowley strain), 4 weeks old , weighied 35-45 gm , were divided into 14 groups each of10 rats except group zero contains 5 rats.

The rats were placed individually in special metabolic cages , after the adaptation period , the rats were fed on the experimental diets as follows :

Group (0) Fed on non protein diet. (starch)

Group (1A) Fed on wheat flour 82% extraction fortified with 2% wheat gluten .

Group (1b) Fed on wheat flour 82% extraction fortified with 4% wheat gluten .

Group (1C) Fed on wheat flour 82% extraction fortified with 6% wheat gluten .

Group (2A) Fed on wheat flour 82% extraction fortified with 2% Corn gluten .

Group (2B) Fed on wheat flour 82% extraction fortified with 4% Corn gluten .

Group (2C) Fed on wheat flour 82% extraction fortified with 6% Corn gluten .

Group (3A) Fed on wheat flour 82% extraction fortified with 2% Casein .

Group (3B) Fed on wheat flour 82% extraction fortified with 4% Casein .

Group (3C) Fed on wheat flour 82% extraction fortified with 6% Casein .

Group (4A) Fed on wheat flour 82% extraction fortified with 5% defatted soy flour .

Group (4B) Fed on wheat flour 82% extraction fortified with 10% defatted soy flour .

Group (4C) Fed on wheat flour 82% extraction fortified with 15% defatted soy flour .

Group Control Fed on wheat flour 82% extraction (Control) .

The animals were leaved for 10 days . Water and food were supplied ad libitum . At the end of experiment feces and urine were collcted. the urine and faces nitrogen were determined by micro Kjeldahl method and five rats from each group were kill under ether anesthesia and dried in an air oven at 70°c then ground to a fine powder after defatting and kept in plastic container at (-20 °C) until analyzed for nitrogen detrmination by micro Kjeldahl.

The other rats in each group were continued 4 weeks , food intake was weighted every second day and the rats were weighted twice weekly .

At the end of experiment period , protein efficiency ratio , and food efficiency ratio were estimated .

The results showed that the best nutritional supplementation was that of casein, followed by defatted soy flour, then wheat gluten and finally corn gluten as compared with control.