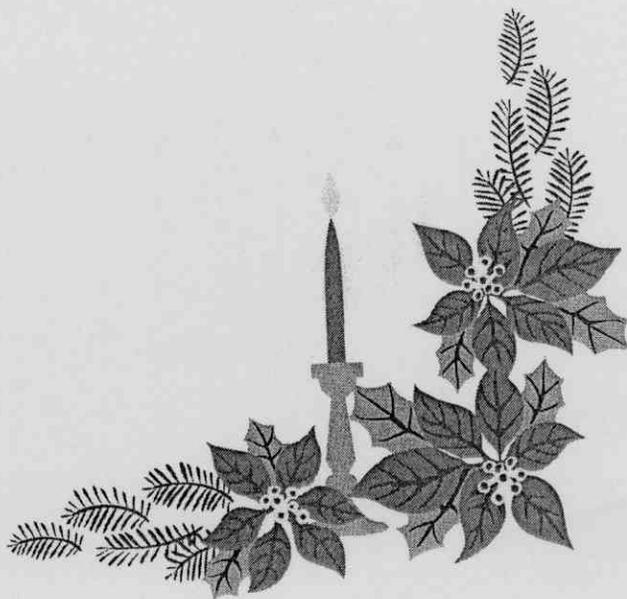




# SUMMARY & CONCLUSION



## 5. SUMMARY

This work aimed to study the effect of supplementation of wheat flour (82% extraction) with hull-less barley flour (70% extraction) and partially defatted soybean flour for bread making. Also, to study the effect of these mixture as hypolipidimic agent on rats receives Hypercholesterolemic diet.

Wheat flour (82% extraction), hull-less barley flour (70% extraction) and partially defatted soybean flours were used for bread making:

Balady bread blends were prepared from:

- 1- Wheat flour (82% extraction) (control).
- 2- Wheat flour (82% extraction) mixed with 5, 10, 15 and 20% hull-less barley flour (70% extraction).
- 3- Wheat flour (82% extraction) mixed with 5, 10, 15 and 20% partially defatted soybean flour.
- 4- Wheat flour (82% extraction) mixed with 5, 10, 15 and 20% from each of hull-less barley flour (70% extraction) and partially defatted soybean flour.

The obtained results could be summarized as follows:

### 1- Chemical composition:

The chemical composition of wheat grains, wheat flour, hull-less barley grains, hull-less barley flour and partially defatted soybean flour were as follows: 11.6, 14.3, 11.1, 13.3 and 5.5% moisture, 1.99, 0.8, 1.95, 1.23 and 7.13% ash, 11.5, 10.5, 9.92, 9.53 and 51.3% crude protein, 2.17, 2.11, 3.66, 2.66

and 6.00% lipids, 2.50, 0.1, 1.27, 0.63 and 3.2% crude fiber, 81.84, 86.49, 83.20, 85.95 and 32.37% carbohydrate and 1.51, 1.22, 1.94 1.79 and 2.09% total sugars. While gluten in wheat flour was 26.7%, hull-less barley flour and partially defatted soybean flour was free from this component.

Pigments values as  $\beta$ -carotenes (ppm) for the wheat grains, wheat flour, hull-less barley grains, hull-less barley flour and partially defatted soybean flour were 2.64, 1.83, 3.07, 2.40 and 13.66 (ppm), respectively. Phytate content values were 0.70, 0.18, 1.30, 0.20 and 2.25% for wheat grains, wheat flour, hull-less barley grains, hull-less barley flour and partially defatted soybean flour, respectively. Also falling number for the abovementioned blends were 395, 380, 444 and 470 "sec", respectively, while non determined falling number for partially defatted soybean flour.

## **2- Rheological characteristics of dough:**

### **a- Farinograph parameters:**

#### **Effect of mixing what flour (82% extraction) with hull-less barley flour (70% extraction):**

Addition of hull-less barley flour at different ratios with wheat flour led to an increase in water absorption. The increment of water absorption may be due to the strong water binding ability of fiber. Dough arrival and development time also dough weakening were increased. The increment in weakening could be attributed to gluten dilution and slow formation of gluten net work.

**Effect of mixing wheat flour (82% extraction) with partially defatted soybean flour:**

Addition of partially defatted soybean flour to wheat flour led to increase water absorption which could be attributed to the strong water binding ability of partially defatted soybean flour fiber and protein. Arrival time, development time and stability were increased. Dough weakening could be attributed to false increment in strength and stability with reduction in dough weakening.

**Effect of mixing wheat flour (82% extraction) with hull-less barley (70% extraction) and partially defatted soybean flour:**

Addition of both hull-less barley flour and partially defatted soybean flour led to an increase in water absorption. But arrival time was the same at 5% hull-less barley flour and partially defatted soybean flour. Dough development time and stability were increased. Addition of hull-less barley flour and partially defatted soybean flour to wheat flour increased dough weakening at ratio 5% while, at 10 and 15% levels weakening was same with control and decreased at 20% level.

**b- Extensograph parameters:**

**Effect of mixing wheat flour (82% extraction) with hull-less barley flour (70% extraction):**

Results show that addition of 10% hull-less barley flour to wheat flour increased dough extensibility, while addition of 15% and 20% hull-less barley flour decreased dough extensibility. The increase in dough extensibility may be due to the absence of gluten in the hull-less barley flour. Increase in resistance to

extension could be due to the deficiency of hull-less barley flour protein in glutenin.

**Effect of mixing wheat flour (82% extraction) with partially defatted soybean flour:**

Results show that dough extensibility increased in ratio 5% while decreased in ratio 10, 15 and 20%. This may be due to blends low gluten content. Also resistance to extension increased. The dough energy of the mixture increased.

**Effect of mixing wheat flour (82% extraction) with hull-less barley flour (70% extraction) and partially defatted soybean flour:**

Dough extensibility decreased by adding hull-less barley flour and partially defatted soybean flours in the different ratios. This may be due to the reduction in gluten content. Also, resistance to extension showed an increment in its value. The dough energy of the mixtures increased at ratios 5 and 15% of both hull-less barley flour and partially defatted soybean flours while decreased at ratios 10 and 20% of both hull-less barley flour and partially defatted soybean flour.

**3- Organoleptic evaluation:**

**Organoleptic evaluation of balady breads produced from wheat flour (82% extraction) mixed with hull-less barley flour (70% extraction).**

The sensory evaluation showed no difference in crust, color, aroma taste, texture and overall acceptability at 5% hull-less barley flour addition compared with control.

**Organoleptic evaluation of balady bread produced from wheat flour (82% extraction) mixed with partially defatted soybean flour.**

The bread mixed with 5% partially defatted soybean flour was golden in color. At higher levels of partially defatted soybean flour addition produced bread with lower sensory score.

**Organoleptic evaluation of balady bread produced from wheat flour (82% extraction) mixed with hull-less barley flour (70% extraction) + partially defatted soybean flour.**

The sensory evaluation of the produced bread showed increment in loaf weight. The overall quality of the bread has lower score than that of the control.

**Biological evaluation:**

Sixty adult male albino rats were used. Rats were randomly divided into equal 6 groups. The first group fed on standard normal diet and served as negative control where as the other groups fed on hyperlipidemic diet rich in fat and cholesterol one group was left to fed on this diet and served as positive control. The other groups were received the following diets:

The experimental lasted for 8 weeks and blood samples were obtained from the retro-orbital plexus of over night fasted rats.

**Group (1):** Rats were fed on the basal diet and served as negative control group (-ve) for 8 weeks

**Group (2):** Rats were daily attained to the hyperlipaemic diet (high cholesterol) and served as a positive control group (+ve) .

**Group (3):** Rats were daily administered wheat flour added to the high cholesterol diet .

**Group (4):** Rats were daily received 85% wheat flour + 15% hull-less barley flour added to the high cholesterol diet.

**Group (5):** Rats were daily received 80% wheat flour + 20% partially defatted soybean flour added to high cholesterol diet.

**Group (6):** Rats were daily received 60% wheat flour + 20% hull-less barley flour + 20% partially defatted soybean flour added to the high cholesterol diet.

**Effect of hypercholesterolemic diet mixed with wheat flour (82% extraction), hull-less barley flour (70% extraction) and partially defatted soybean flour on body weight, food intake and feed conversion:**

Data show that rats fed wheat flour minced with partially defatted soybean flour had the highest values of food intake and feed conversion. This may be due to the good nutritional value of hull-less barley flour and partially defatted soybean flour.

**Effect of different experimental diets on serum triglycerides, total cholesterol, LDL-cholesterol, HDL-cholesterol and risk ratio in hypercholesterolemic rats after the end of experimental period (8 weeks):**

The effect of feeding rats on the diets containing hull-less barley flour and partially defatted soybean flours at different levels on the contents of triglycerides, total cholesterol, LDL- and HDL-cholesterol (mg/100 ml). In comparison to rats fed basal diet, the level of triglycerides increased to about 2.94 fold, while the level of serum total cholesterol was increased from 120.09 to 250.04 mg/100 ml in hypercholesterolemic rats. However, the levels of triglycerides of rats fed diets containing different levels of hull-less barley flour and partially defatted soybean flour were 128.75, 118.50 and 121.25 mg/100 ml for 85% wheat flour plus 15% hull-less barley flour, 80% wheat flour plus 20% partially defatted soybean flour and 60% wheat flour plus 20% hull-less barley flour and 20% partially defatted soybean flours, respectively.

On the other hand, rats fed diets containing wheat flour supplemented with different levels of hull-less barley flour and partially defatted soybean had the lowest values of total cholesterol, LDL-cholesterol and risk ratio, while rates fed hypercholesterolemic diets had the highest values for the same parameters it contained higher values rats fed hypercholesterolemic diets. The mean values of total cholesterol for these groups were 158.50, 174.75 and 176.00 mg/100 ml, but this values for hypercholesterolemic rats was 250.04 mg/100 ml. However, risk ratios (total cholesterol/HDL-cholesterol of hyper-

cholesterolemic rats was higher (8.18) than that of rats fed diets containing different levels of hull-less barley flour and partially defatted soybean flour, where the ratios were ranged between 2.63 and 3.34.

From the above-mentioned results, it can be concluded that serum triglycerides, total cholesterol and low-density lipoprotein (LDL) cholesterol values were significantly lower in rats fed on wheat flour supplemented with hull-less barley flour and partially defatted soybean flour than those fed hypercholesterolemic diets.

#### **Effect of different experimental diets on liver functions in hypercholesterolemic rats:**

Alanine transaminase (ALT) and aspartate transaminase (AST) were also determined as indicators of liver functions, since the increase in these activities may be that the liver become abnormal case. The levels of these parameters in rats fed on hypercholesterolemic diet were 74.00 and 43.25 U/L compared with 32.75 and 37.50 U/L for rats fed on basal diet.

From the obtained results it could be observed that the enzymes related to liver functions in hypercholesterolemic rats had a higher mean values of ALT and AST than that rats fed on basal diet. On the other hand, rats fed on wheat flour 100% and other different levels of hull-less barley flour and partially defatted soybean flour had the lowest mean values of the two enzymes (ALT and AST) activity than rats fed on hypercholesterolemic diets, while, the activity of these two enzymes of rats fed wheat flour supplemented with hull-less barley flour and partially defatted soybean flour was similar to

that of rats fed on basal diet. From the above-mentioned results it can be concluded that both hull-less barley flour and partially defatted soybean flour improve have improved liver functions in rats fed hypercholesterolemic diets.

**Effect of replacing wheat flour (82% extraction) with hull-less barley flour (70% extraction) and partially defatted soybean flour at different levels on kidneys functions and hemoglobin in hypercholesterolemic rats after 8 weeks**

From the obtained data of serum creatinine, urea and hemoglobin of hypercholesterolemic rats after 8 weeks of experimental period. It could be observed that rats fed hypercholesterolemic diet had the higher mean values of creatinine, urea and hemoglobin contents (2.55, 99.00 and 13.87, respectively) than that rats fed basal diet (0.48, 26.81 and 13.77, respectively). However, the mean values of creatinine were 0.64, 0.80, 1.65 and 1.23 for the above-mentioned diets. But the mean values of urea contents were 29.80, 41.98, 70.43 and 64.25 for 100% wheat flour, 85% wheat flour plus 15% hull-less barley flour, 80% wheat flour plus 20% partially defatted soybean flour and 60% wheat flour plus 20% hull-less barley flour + 20% partially defatted soybean flours, respectively. On the other hand, the levels of hemoglobin in rats fed on different diets was found to be 7.30, 9.55, 7.83 and 8.35.