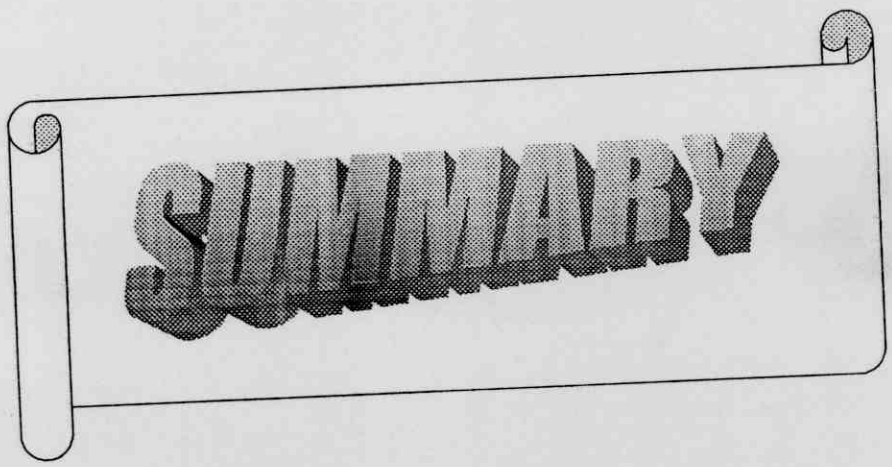
SUMMARY

5. SUMMARY

This study was carried out to evaluate the fortification of wheat flour (72 % extraction) with two different levels of egg yolk powder, whey powder (1 and 3 g / 100 g flour). And three levels of L. ascorbic acid (2, 8 and 18 mg / 100 g flour).

- The results obtained could be summarized as follows:

- Egg yolk and whey powders contained 4.0 and 4.4 % moisture, 30.53 and 9.76 % protein, 57.4 and 0.8 % ether extract, 2.02 and 6.47 % ash and 8.05 and 82.97 % total carbohydrates, respectively.

- Fortification of wheat flour (72 %) with egg yolk powder increased protein, ether extract and ash, and decreased the carbohydrate contents, while the fortification with whey powder increased ash content. The other components were not affected by the fortification of whey powder.

- Egg yolk had the highest ratios of iron, calcium and phosphorus, while whey had the highest ratios of magnesium, sodium and potassium.

- Pan bread fortified with 3 g egg yolk and whey/100 g flour had higher content of sodium, calcium, potassium and phosphorus than that fortified with 1 g egg yolk and 1 g whey and the pan bread without fortification (control).

- The addition of ascorbic acid to the flour dough at levels of 2, 8 and 18 mg/100 g flour caused a slight decrease on water absorption and an increase in stability. The addition of egg

yolk powder at levels of 1 and 3 g/100 g flour increased water absorption and stability values. The addition also decreased mechanical tolerance index and dough weakening values.

- The addition of whey powder at the levels of 1 and 3 g/100 g flour caused a decrease in water absorption, mechanical tolerance index and dough weakening and an increase in stability values.

- The addition of ascorbic acid in addition to egg yolk and whey powder caused a decrease in absorption, mechanical tolerance index and dough weakening and an increase in mixing time and stability.

- The addition of ascorbic acid to the flour dough at levels of 2, 8 and 18 mg/100 g flour caused a decrease in extensibility and an increase in the resistance to extension, proportional number and energy.

- The addition of 1 g egg yolk increased the resistance to extension value and proportion number of the dough, while decreased the extensibility and energy values. On the other hand the dough contained 3 g egg yolk had a decrease in the resistance to extension, extensibility value, proportional number and energy value. Also dough contained 1 g whey had a decrease in a resistance to extension value and energy value comparing with the control, while it had an increase in extensibility value and proportion number. The dough fortified with 3 g whey had a decrease in resistance to extension, proportional number and energy compared to the control, while it had increased extensibility than that of control.

- Protein digestibility of egg yolk was 96.6 % and it was 96.9 % in whey powder. Protein digestibility in pan bread fortified with 3 g levels of egg yolk and whey was (86.2 %), while pan bread fortified with 1 g level of each egg yolk and whey, the protein digestibility was 80.3 % comparing with the control sample (77.6 %).

- The stability of vitamin C was lost in dough after fermentation than that before fermentation by about 3 %. After bread making, the stability of vitamin C decreased by about 23.84 %. The storage period of pan bread also affected the stability of vitamin C by about 76.7 % after 3 days of storage period.

- The fortification with ascorbic acid, egg yolk or whey increased the loaf volume and specific volume of pan bread.

- The pan bread fortified with 3 g egg yolk, 3 g whey and 18 mg ascorbic acid/100 g flour had a higher volume and specific volume than that fortified with 1 g egg yolk, 1 g whey and 8 mg ascorbic/100 g flour.

- Pan bread fortified with 3 g egg yolk, 3 g whey and 18 mg ascorbic acid staled slowly and the rate of decrease in moisture was less than that fortified with 1 g egg yolk, 1 g whey and 8 mg ascorbic acid and the control bread.

- The fortification of pan bread with 3 g egg yolk, 3 g whey and 18 mg ascorbic acid/100 g flour caused a significant increase in external, internal characteristics and over all scores than that the control and the fortified pan bread with 1 g egg yolk, 1 g whey and 8 mg ascorbic acid/100 g flour.