• 5- SUMMARY

The present work was carried out to study the effect of substituting corn meal, and barley flour by different ratios 5, 10 and 20% respectively to 95, 90 and 80% wheat flour 72% extraction to produce butter cake, and sponge cake with improvers (pectin, lecithin or CMC 1% carboxy methyl cellulose) on chemical, staling and sensory evaluation.

- Also, to study the effect of adding 20% corn meal to wheat flour 72% extraction to produce cracker (Bretizel) on chemically, and sensory evaluation.

- On the other hand, the penterometer apparatus was used in determining the staling and suggested relation between penterometer reading and AWRC.

- Study the substitutions of wheat flour by corn meal, and barley flour with pectin, and CMC on rheological properties.

The obtained results can be summarized as follows :

- Raw materials table results were that, wheat flour 72% extraction was high content in total carbohydrates and protein (86.26% and 11.42%), compared to (83.38%, 9.11, and 85.26%, 8.99%) for corn meal and barley flour, respectively.

- Corn meal had the highest ratios of total fat it was (4.13).

Chemical composition of produced cakes

- Concerning the chemical composition of butter cak s (controls) and butter cakes with improvers. Results showed at, Protein contents for all butter cakes were 8.80, 8.82, 8. 1, 8.83% of control, butter cake with pectin, butter cake with ecithin, and butter cake with CMC 1%, respectively.

- Regarding the chemical composition of sponge cak s (controls) and sponge cakes with improvers 1% ratio, data howed that, protein content, ash, and total carbohydrates were ost similar among control, sponge cake with pectin, sponge cake with lecithin, and sponge cake with CMC 1%.

- Concerning the chemical composition of butter cakes with substitutions ratios. Results indicated that, prote content for control was higher than all treatments in Table (4).

The lowest ratios of protein contents with 20% arley flour substitutions.

- The total carbohydrates with 20% barley flour sub titution was higher than 20% corn meal substitution.

Also, control had the highest ratio, it was 6 54 of total carbohydrates.

- Control treatment had the lowest ratio of ash c ntent, it was 1.63% compared to all other treatments.

- The treatment with barley flour had the high value of protein digestability compared to the treatment with corn meal..

- Data showed, increasing in lipids content from 5% corn meal to 20% corn meal, substitutions.

Chemical composition of **sponge cakes with substitutions**

The data showed that protein content had decreased gradually from 5% - 20% substitutions corn meal, and barley flour relative to control treatment.

- For lipids content, the obtained data revealed that, a slight increasing noticed in sponge cakes from 5% - 20% substitutions with corn meal, and barley flour, frequently.

- Control treatment had the highest value of protein digestability, it was 78.66%, on the other hand, added barley flour substitutions caused to increase the protein digestability.

- Control had the highest value of total carbohydrates compared to other treatments.

Chemical composition of cracker product with corn **meal substitutions:** Data revealed that,

- The treatments with malt, had the highest values of protein digestability compared to the rest of treatments without malt with 10% corn meal substitutions except control treatment.

- All treatments were almost similar contents of lipids.

Minerals content mg/100g of raw materi
cakes, sponge cakes and cracker products:

- Wheat flour had the lowest ratios of Mg, Zn, Mn,
- Butter cake with 20% barley flour substituti
  highest ratio of Mg, Na, Zn, Fe, Ca, and K.
- Meanwhile, control of butter cake had the low
  Mg, Na, Mn, Fe, and Ca.

- Regarding the control of sponge cakes, the result
control had the lowest ratios of Mg, Na, Zn, Mn, Fe

- Also, calcium content was the highest ratios in
flour substitutions. Meanwhile, the lowest ratios
corn meal substitutions.

- Regarding the sponge cakes with CMC 1%
substituted 5% corn meal had higher ratio of Mg,
Mn than 5% barley flour or 10% corn meal.

- On the other hand, the treatment with 5% barl
higher ratios of iron, compared to control.

- Effect of adding different improvers on wheat
extraction of cake staling (AWRC), the data notice
was a gradual ' decrease in AWRC values d
temperature storage of butter cake controls.

- From reading penetrometer instrument, indicated th
AWRC% decreased, the penetrometer reading increas

- Dealing with sponge control cakes with improv
that, control of sponge cake with pectin had the high
AWRC% at zero time..

Is, butter

e and Ca

n had the

st ratios of

owed that,
d Ca.

20% barley
as in 20%

found that,
a, Zn, and

y flour was

our of 72%
that, there
mg room

t, when the

rs, noticed
st ratios of

- Substituted barley flour with pectin in butter cake caused to decrease in AWRC regarding of corn meal substitutions.

- Reading penetrometer at zero time was the lowest reading compared to reading after 3 days, and 6 days.

Organoleptic properties :

- For the butter cakes with pectin data revealed that, butter cake with pectin had the highest score of texture, followed by 5% corn meal, 5% barley flour, 10% corn meal, 10% barley flour and 20% corn meal, barley flour.

- From the statistical analyses, there were no significant differences between 5% corn meal, and 5% barley flour, also, among 10% corn meal, 10% and 20% barley flour.

- Dealing with crust color score, data showed that, there were significant differences between butter cake with pectin and all other treatments.

- There were no significant differences among 5% corn meal, 5% barley flour, and 10% corn meal, respectively.

- Concerning taste, shape and overall acceptability, data showed that, control had the highest score followed by 5% substitution for both corn meal, and barley flour, followed by 10%, 20 corn meal, and 10%, and 20% barley flour.

- From the data illustrated before, we showed that, substituted wheat flour 72% extraction with corn meal, and barley flour as 5% ratio, did not change the most sensory evaluations (characteristics) of organoleptic tests.

- Also, substituted 10% barley flour and corn meal, ad the same score in organoleptic test, these refer to the ability for using barley flour as well as corn meal to produce sponge cakes and butter cakes.

- For the improvers which were added on the produc and the gave effect to the staling ratios, data showed that, p ctin had the best affected for retarding the staling ratios; frequent y, effect on shelf life of the products; butter cakes as well as spo ge cakes by concentrated 1%, followed by lecithin 1% added, an followed by CMC 1%.