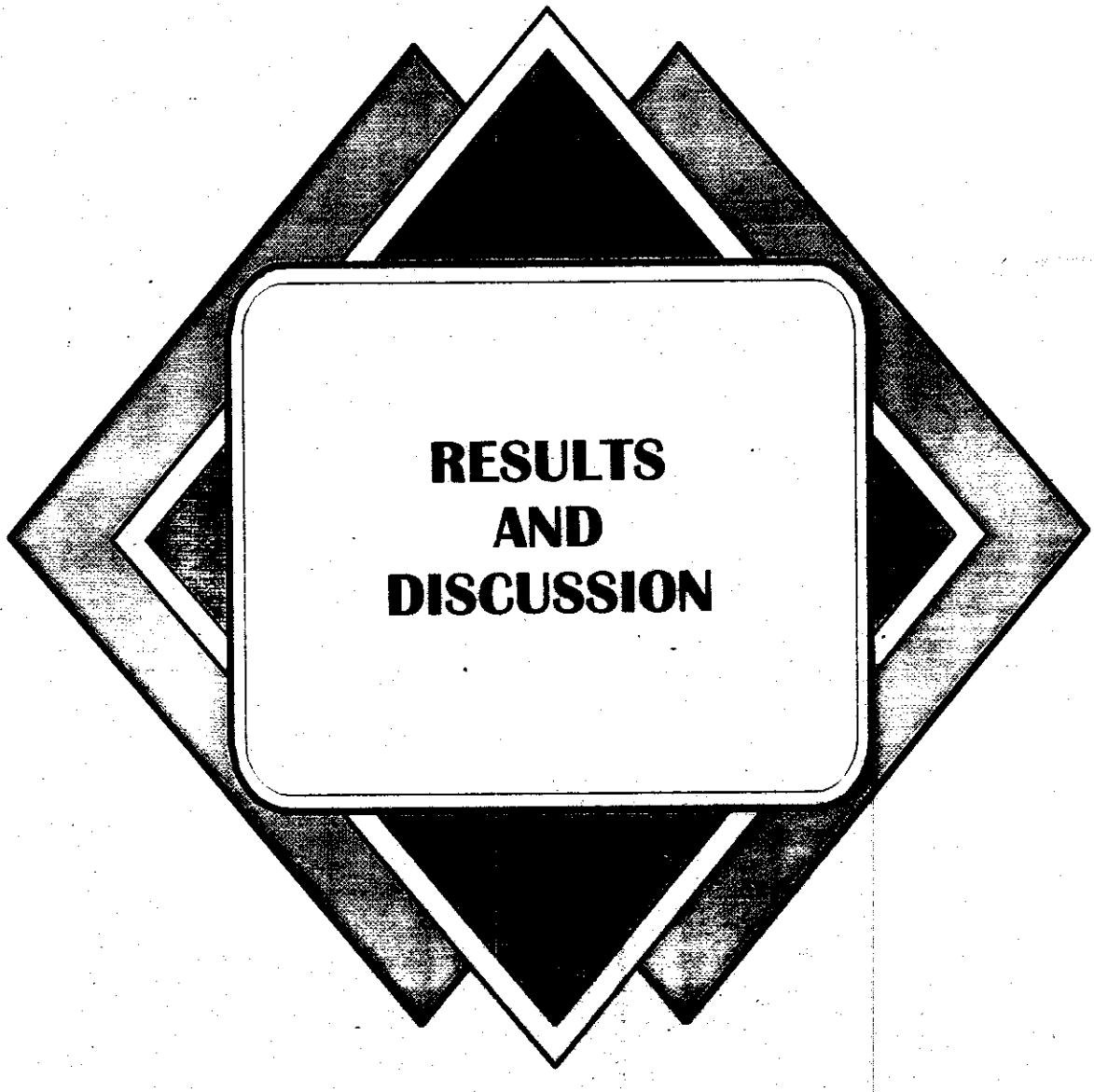
RESULTS
AND
DISCUSSION

RESULTS AND DISCUSSION

Table (4): Chemical composition of row materials on dry basis

Tested Samples	moisture	protein	Fat	Ash	fiber	Carbohydrats*
Wheat flour 72 extortion	11.1	11.4	0.78	0.55	0.7	75.47
Wheat flour 82% extraction	11.7	12.6	1.3	0.92	1.1	72.38
Corn flour	10.9	8.9	3.5	1.5	2.9	72.3
Corn gluten	10.2	60	4	5.2	6.1	14.5
Wheat gluten	9.5	74	1.9	0.6	0.3	13.7
Casein	10	85	0.5	3.5	0.0	1
Defatted soy flour	10.3	42	3.5	3.95	6.5	33.75

* Calculated by differenc.

The result in Table (4) showed that moisture content in wheat flour 72%, 82% extraction and corn flour 80% extraction were 11.1 , 11.7 and 10.9% respectively. also the moisture content in corn gluten, wheat gluten, casein and defatted soy flour were 10.2 , 9.5 , 10 and 10.3% respectively. As well as the protein content of wheat flour 72% extraction, wheat flour 82% extraction and corn flour 80% were 11.4 , 12.6 and 8.9%. From the same Table it could be noticed protein content in corn gluten, wheat gluten casein and defatted soy flour were 60, 72, 85 and 42% respectively. Regarding fat contents in corn gluten it was higher in wheat flour corn flour wheat gluten casein and defatted soy flour, it was 0.781 for wheat flour 72% extraction 1.3 for wheat flour 82% extraction 3.5 for corn flour 4% for corn gluten 1.9% for wheat gluten 0.5% for casein and 3.5% for defatted soy flour the fiber content were 0.7% for what flour 72% extraction 1.1% for wheat flour 82% extraction 2.9% for corn flour 6.1% for corn gluten 0.3% for wheat gluten and 6.5% for soy flour. The ash contents were 0.55% for wheat flour 72% extraction 0.92% for wheat flour 82% extraction 1.5% for corn flour 5.2% for corn gluten 0.6 for wheat gluten 3.5% for casein and 3.95 for soy flour. Carbohydrates were 75.47% for wheat flour 72% extraction 72.38% for wheat flour 82% extraction, 72.3% for corn flour and 14.5 for corn gluten. These result in accordance with the results of ***El-Shazly (1984) , yaseen (1985) and schur (1991).***

Table (5): *Percentage* of Amino acid content of wheat gluten

Amino acid	Wheat gluten %
Aspartic	2.56
Threonine *	1.90
Serine	3.33
Glutamic	24.25
Proline	11.08
Glysine	2.58
Alanine	2.13
Cysteins	1.02
Valine *	3.13
Methionine *	1.12
Isoleucine *	2.91
Leucine *	5.82
Tyrosine	2.25
Phenylalanine *	4.17
Histidine *	1.99
Lysine *∇	1.13
Arginine *	2.60
Tryptophan *	0.72

* Essential amino acid

Total essential amino acid "E.A.A" = 25.49

Total non essential amino acid "N.E.A.A" = 49.2

Total determined amino acid "D.E.A.A" = 74.69

E.A.A. / N.E.A.A. = 1 : 1.9

∇ Limiting Amino Acid

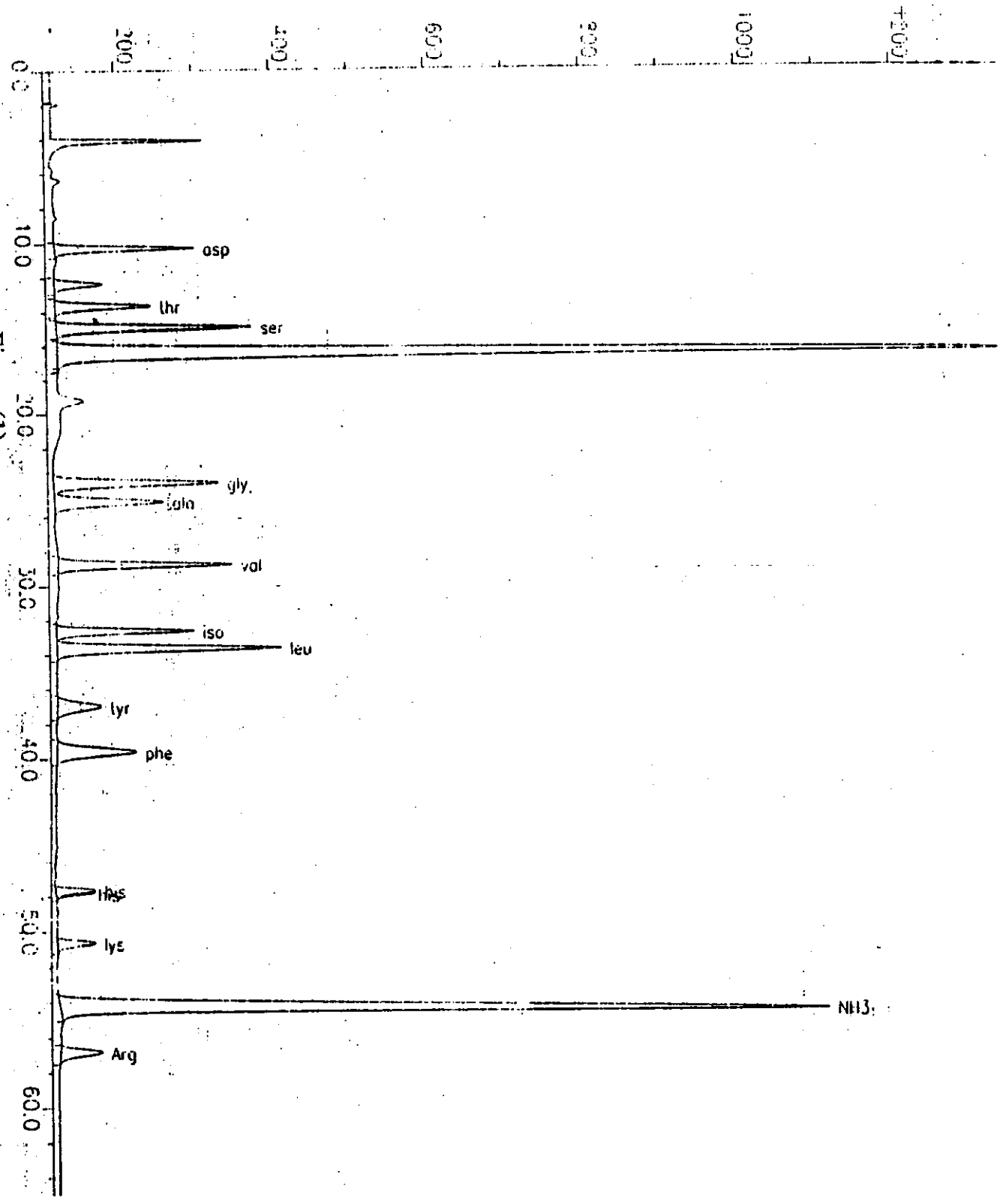

Figure (1)
Amino acid Composition of wheat gluten

Amino acid profile of wheat gluten additive .

The amino acid content of wheat gluten represented in Table (5) and figure (1) showed that the total determined amino acid content was 74.69% . The total essential amino acid were 25.49% while the non essential amino acid content were 49..2% with ratio of 1: 1. 9 . On the other hand Lysine was the first limiting Amino Acid in wheat gluten. The results were in agreement with those obtained by ***Dubois and cottel (1969).***

Table (6) : *Percentage* of Amino acid content of corn gluten .

Amino acid	Corn gluten%
Aspartic	2.49
Threonine *	1.31
Serine	1.86
Glutamic	10.83
Proline	4.16
Glysine	1.10
Alanine	3.71
Cysteins	0.56
Valine *	1.93
Methionine *	0.65
Isoleucine *	1.71
Leucine *	7.32
Tyrosine	1.99
Phenylalanine *	2.70
Histidine *	1.08
Lysine *∇	0.66
Arginine *	1.35
Tryptophan *	0.62

* Essential amino acid

Total essential amino acid "E.A.A" = 19.33

Total non essential amino acid "N.E.A.A" = 26.7

Total determined amino acid "D.E.A.A" = 46.03

E.A.A. / N.E.A.A. = 1 : 1.4

∇ Limiting Amino Acid

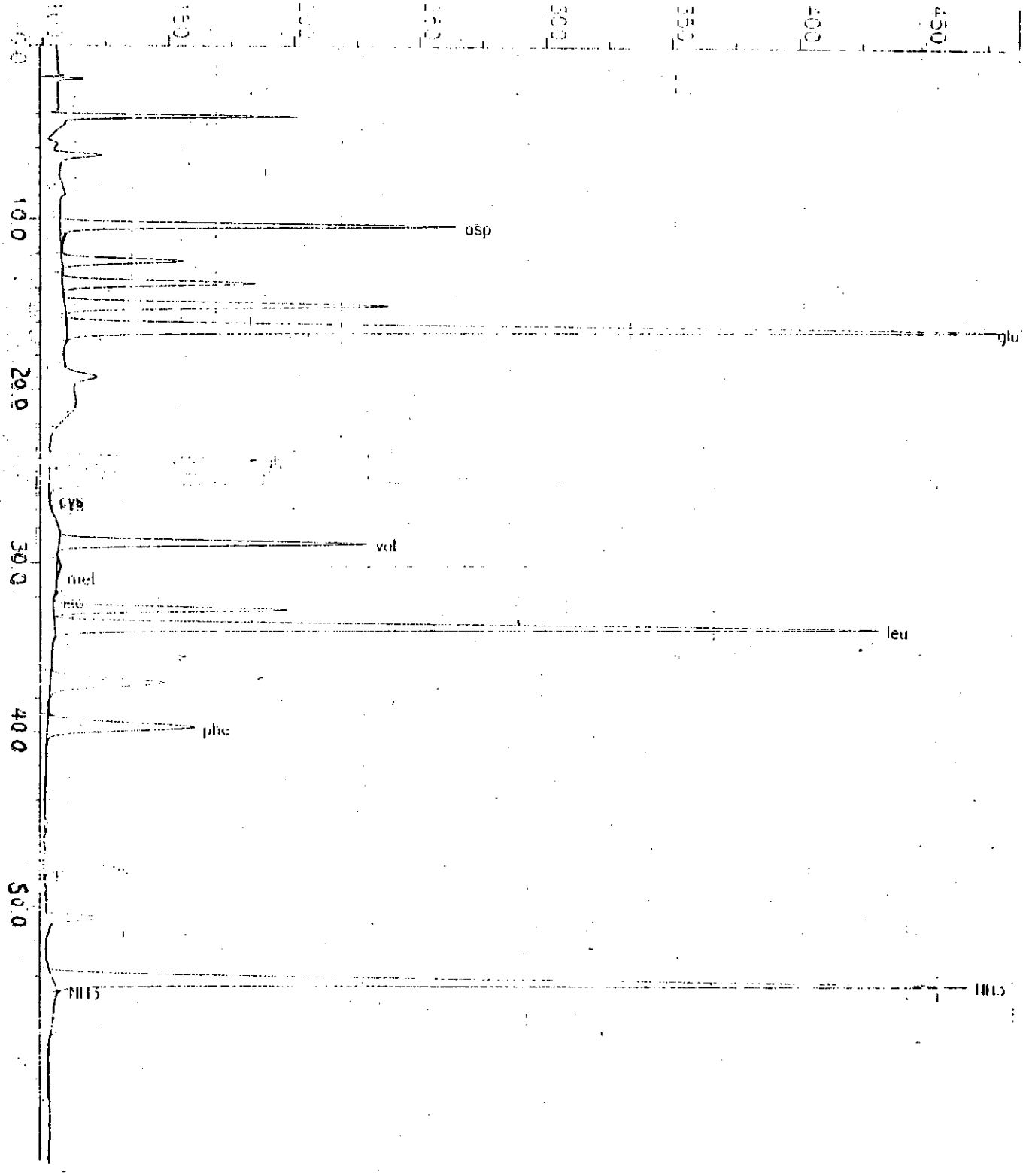

Figure (2)
Amino acid Compostion of corn gluten

Amino acid profile of corn gluten additive

The amino acid content of corn gluten show in Table (6) and fig (2) manifests that the total determined amino acid content , was 46.03% . The total essential amino acid was 19.33 while the non essential amino content was 26.7% with ratio 1:1.4 The Lycine was limiting Amino acid in corn gluten .These mentioned results were coincide with those reported by ***Abou Raya (1980).***

Table (7) : Percentage of Amino content of casein

Amino acid	Casien
Aspartic	5.60
Threonine *	3.85
Serine	4.64
Glutamic	20.57
Proline	11.36
Glysine	1.70
Alanine	2.95
Cysteins	0.36
Valine *	5.29
Methionine *	2.5
Isoleucine *	4.96
Leucine *	9.41
Tyrosine	4.53
Phenylalanine *	4.88
Histidine *	3.20
Lysine *∇	7.72
Arginine *	3.32
Tryptophan *	2.4

* Essential amino acid

Total essential amino acid "E.A.A" = 47.53

Total non essential amino acid "N.E.A.A" = 50.91

Total determined amino acid "D.E.A.A" = 98.44

E.A.A. / N.E.A.A. = 1 : 1.1

∇ Limiting Amino Acid

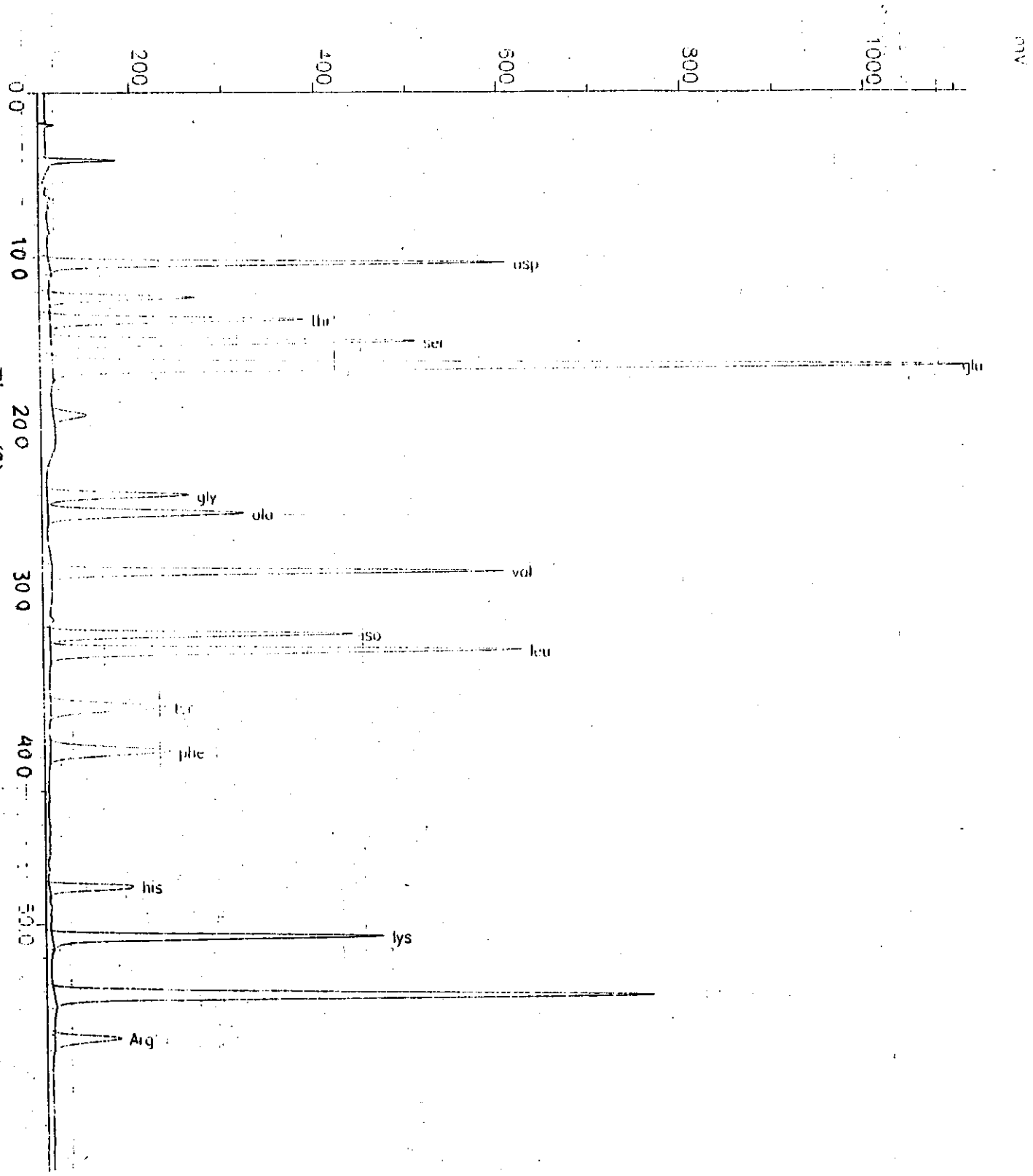
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Figure (3)

Amino acid profile of casein additive

The amino acid content of casein represented in Table (7) and fig (3) showed that the total determined amino acid content was 98.44% . Total essential amino acid content was 47.53% while the total non essential amino acid content was 50.91% with ratio 1:1.1 While methionine was limilting amino acid in casien .These results were in accordance with those obtained by ***Bunjapamai et al (1982).***

Table (8): Percentage of Amino acid content of defatted soy flour

Amino acid	Soy flour
Aspartic	5.67
Threonine *	1.60
Serine	1.70
Glutamic	10.31
Proline	2.68
Glysine	2.06
Alanine	2.19
Cysteins	0.86
Valine *	2.39
Methionine *	0.81
Isoleucine *	2.32
Leucine *	3.98
Tyrosine	1.15
Phenylalanine *	2.55
Histidine *	1.68
Lysine *∇	3.43
Arginine *	0.65
Tryptophan *	

* Essential amino acid

Total essential amino acid "E.A.A" = 22.42

Total non essential amino acid "N.E.A.A" = 26.62

Total determined amino acid "D.E.A.A" = 49.04

E.A.A. / N.E.A.A. = 1 : 1.2

∇ Limiting Amino Acid

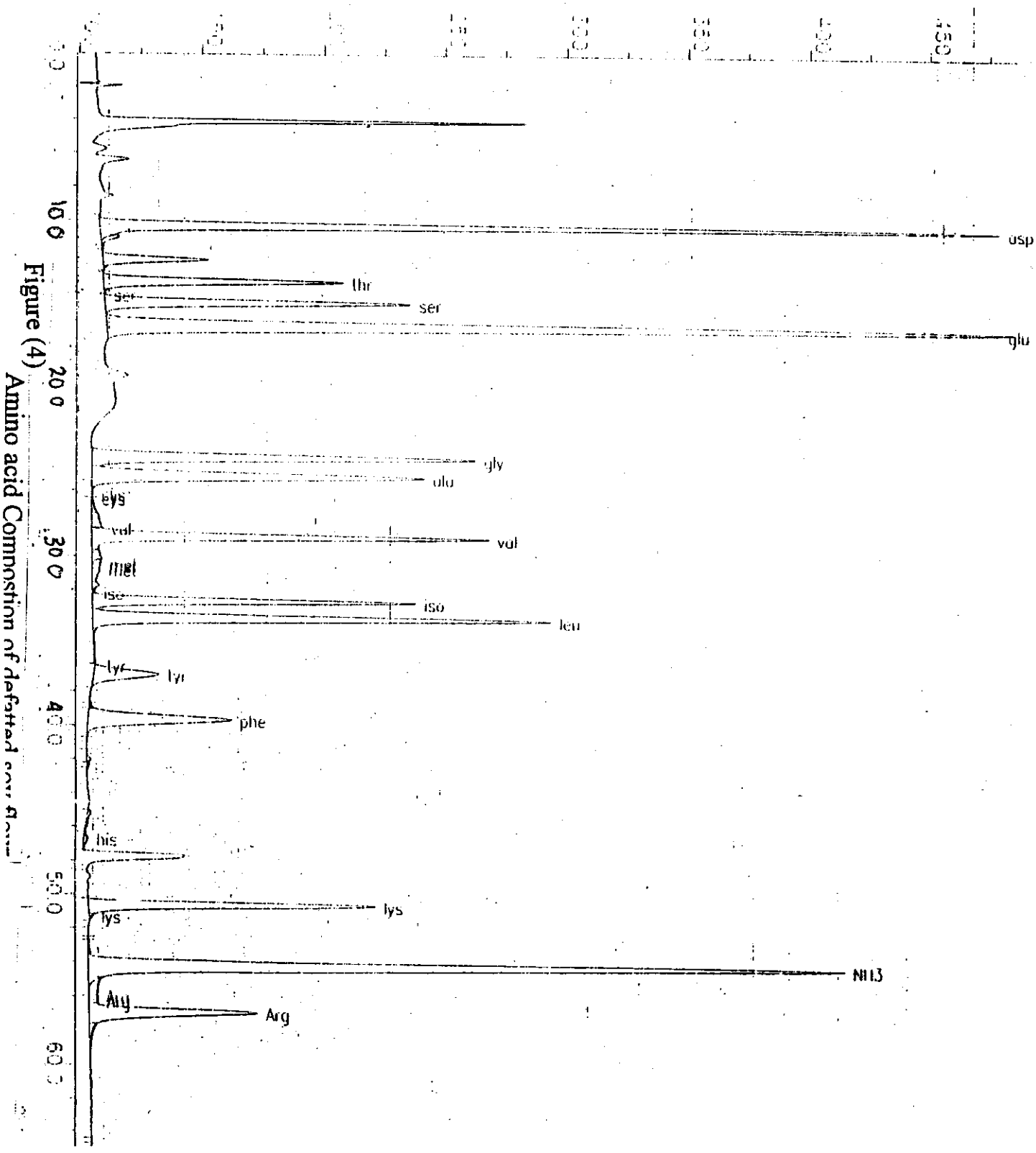


Figure (4) Amino acid Composition of defatted soy flour

Amino acid profile defatted soy flour additive

The amino acid content of defatted soy flour protein shown in Table (8) and fig(4) manifests that the total determined amino acid content was 49.04 the total essential amino acid content was 22.42% while the non essential amino was 26.62% with ratio of 1:1.2 . On the other hand methionine was the first limiting amino acid in defatted soy flour . These result were in line with those obtained by ***Chernikova (1972)***.

Table(9):Farinograph parameters of wheat flour 72% extraction as affected by different levels of some substitutes.

Tested samples	water absorption %	mixing time (min)	Dough development (min)	Dough stability (min)	Dough weakening (B.U)
Control (wheat flour 72% extraction).	54.0	1.0	2.0	9.[illegible]	80
Fortification with wheat gluten levels.					
2 %	55.0	1.0	2.25	10.0	60
4%	56.7	1.25	2.. 5	12.5	50
6%	58.0	1.[illegible]5	2.5	14.5	40
Fortification with corn gluten levels					
2 %	54.8	1.25	2.0	8.5	80
4%	55.9	1.5	2.5	8.5	80
6%	56.2	1.5	2.5	7.0	90
Fortification with casein levels					
2%	55.5	1.5	2.0	8.5	80
4%	56.6	1.5	2.0	8.0	80
6%	58.1	1.5	2.5	7.0	90
Fortification with defatted soy flourlevels					
5%	56.1	1.5	3.5	8.75	80
10%	58.7	2.5	4.0	8.50	80
15%	60.1	3.5	4.5	7.50	90

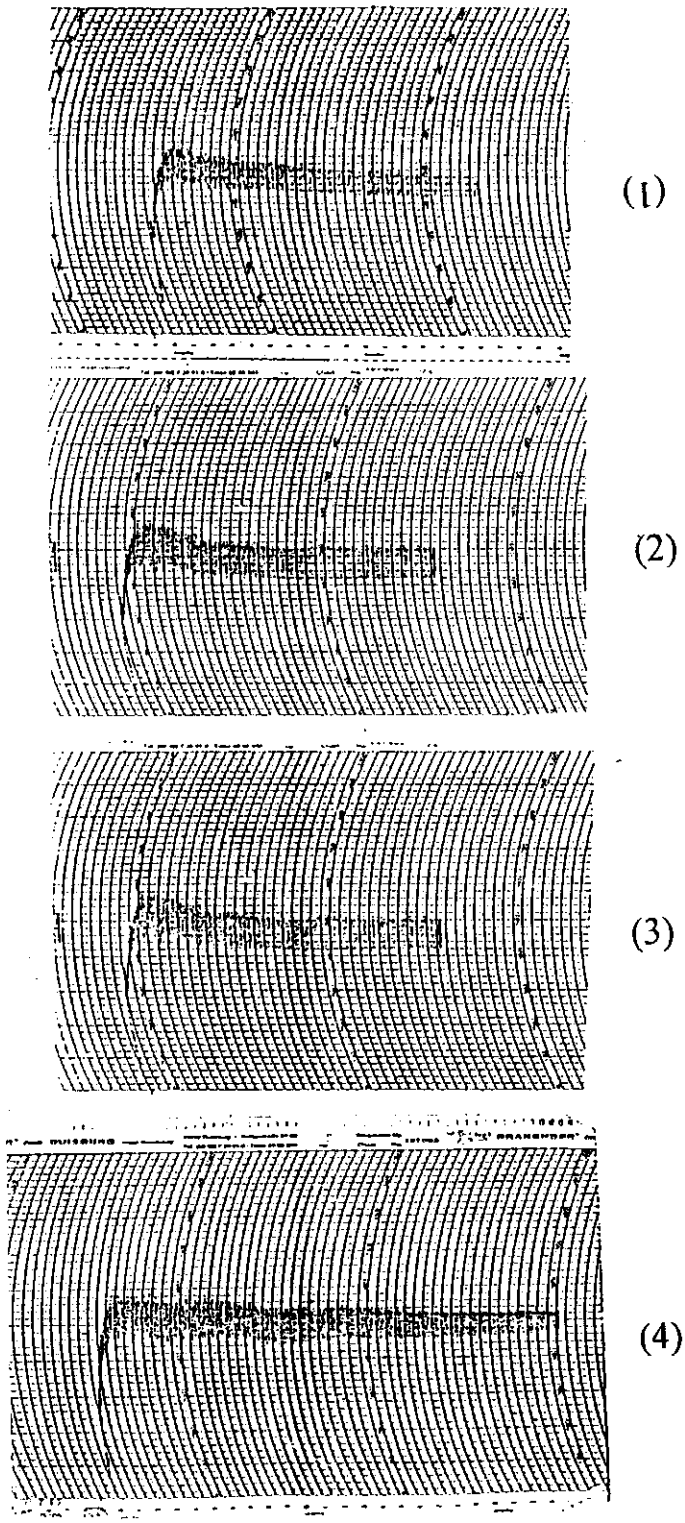


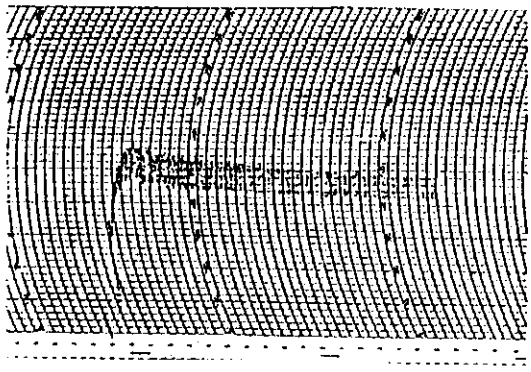
Figure (5)

1- Control .

2- Wheat flour (72%) + wheat gluten 2%

3-. Wheat flour (72%) + wheat gluten 4%

4- Wheat flour (72%) + wheat gluten6%



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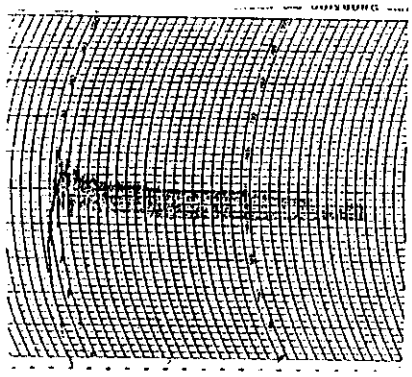

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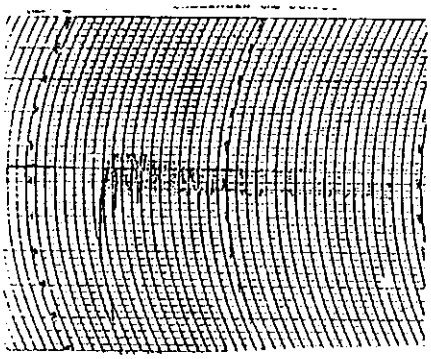

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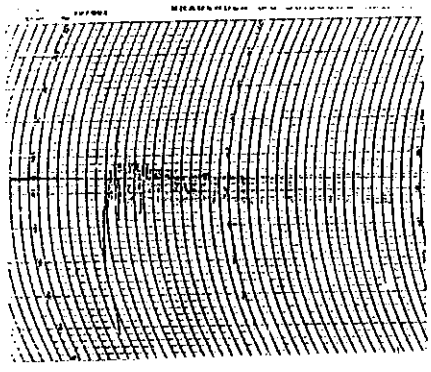


(4)

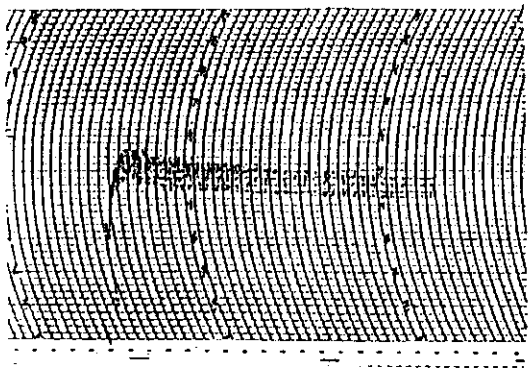
Figure (6)

1- Control

2- Wheat flour (72%) + corn gluten 2%

2- Wheat flour (72%) + corn gluten 4%

3- Wheat flour (72%) + corn gluten 6%



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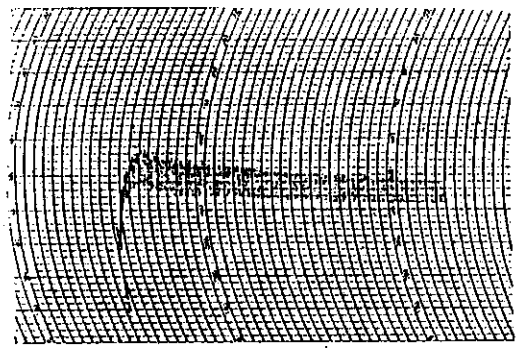

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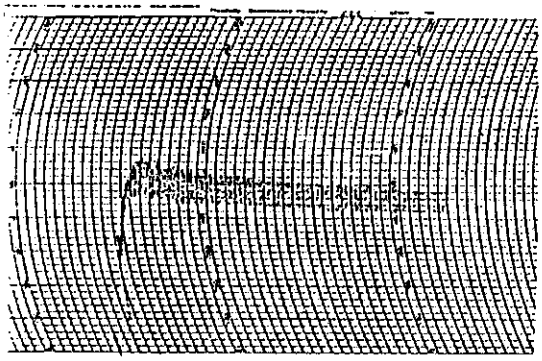

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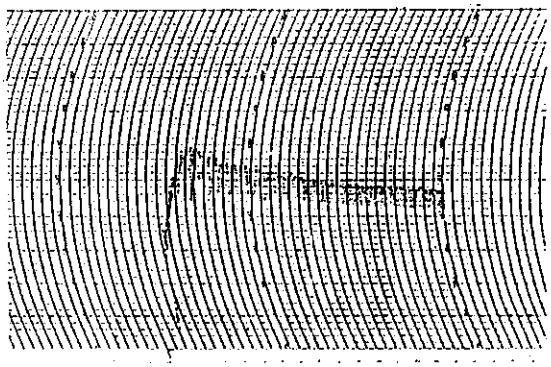


(4)

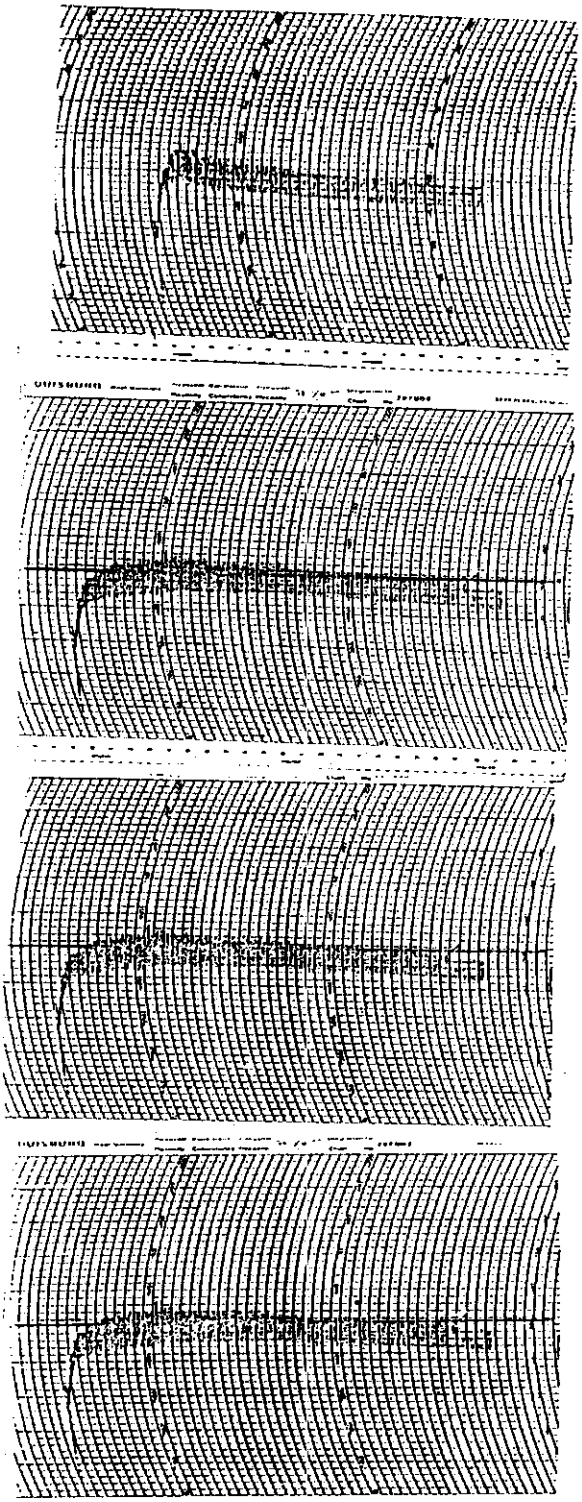
Figure(7)

1- Control

2- Wheat flour (72%) + casein 2%

2- Wheat flour (72%) + casein 4%

3- Wheat flour (72%) + casein 6%



(1)

(2)

(3)

(4)

Figure (8)

1- Control

2- Wheat flour (72%)+ deffatted soy flour 5%

2- Wheat flour (72%) + deffatted soy flour 10%

3- Wheat flour (72%) + deffatted sou flour 15 %

Effect of adding wheat gluten, corn gluten , casein and defatted soy flour to wheat flour (72% extraction) on the rhelological properties of dough:

Farinograph test :

Table (9) and figure (5, 6 , 7, 8) showed the farinograph parameters of wheat flour as affected by different levels wheat gluten 2,4 and 6% corn gluten 2,4and6% casein 2,4. and 6% and defatted soy flour 5,10 and 15% .

Wheat flour fortified with different levels of wheat gluten :

The data in Table (9) and figure (5) showed that addition of wheat gluten at levels of 2, 4 and 6% to wheat flour lead to increase water absorption which recorded (55, 56 and 58%) compared with control (54%). Concerning the mixing time no change between control and addition of 2% wheat gluten while addition 4 and 6% wheat gluten lead to increase mixing time which recorded (1.25 and 1.5 min) respectively compared with control (1.0 min) the addition of 2, 4 and wheat gluten lead to increase dough development time which recorded(2.25, 2.5 and 2.5 min) respectively compared with control (2.0 min). On the contrary dough stability increased which recorded (10,12 and 14 min) compared with control (9.0 min) also dough weakening decreased. It recorded (60, 50 and 40 B.U) compared with control(80. B.U) The above mentioned results were in harmony with those obtained by ***Gracza (1960).***

Wheat flour additive with different levels of corn gluten :

The data in Table (9) and figure (6) showed that addition of corn gluten to wheat flour at levels of 2.4 and 6% increasing water also arption which recorded (54.8 , 55.9 and 56.2%) compared with control (54%) .Also addition of corn gluten to wheat flour lead to increase mixing time which recorded (1.25 1.5 and 1.5 min) compared with control (1.0 min) as well as , the data showed that dough development time no changed between control and addition of 2% corn gluten while addition of 4 and 6 % corn gluten lead to increase dough development time which recorded (2.5 and 2.5 min) respectively compared with control (2.0 min) on the contrary, addition of corn gluten to wheat flour decreased dough stability which recorded (8.5 , 8.0 and 70 min) compared with control (9.0 min) . Also the dough weakening no changed between control and addition of 2 and 4% of corn gluten while addition of 6% lead to increase dough weakening which recorded (90.B.U) compared with control(80 B.U)These results were in line with those obtained by ***Hussein et al (1976).***

Wheat flour subblemented with different levels of casein :

The data in Table (9) and fig (7) showed that addition of casein at level of 2,4 and 6% to wheat flour in creased water absorption which recorded (55, 56.6 and 58.1%) compared with

control (54.0%). Also mixing time increased. recorded (1.5, 1.5 and 1.5 min) respectively compared with control (1.0 min) concerning the development time, there was no change between control and addition 2. and 4% casein while addition of 6% led to increasing development time which recorded (2.5 min) also dough stability decreased which recorded (8,5 ,8 and 7.0 min) compared with control 9.0 .Also the data dough weakening no changed between control and addition of 2 and 4% of casein while addition of 6% load to increase dough weakening which recorded (90 B.U) compared with control (80 B.u) these findings were in line with those obtain by ***Hawas (1975).***

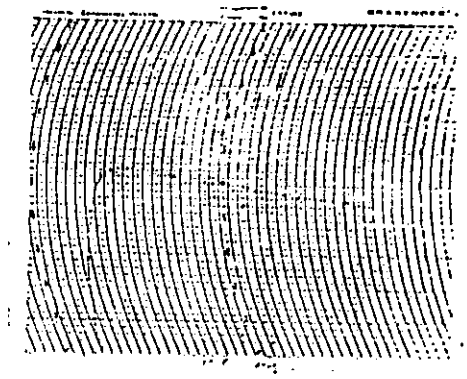
Wheat flour fortified with different levels of defatted soy flour:

The data in Table (9) and figure (8) showed that addition of defatted soy flour at levels 5, 19 and 15% to wheat flour increased water absorption which recorded (56.1 , 58.7 and 60.1 %) compared with control (54%) these increase in water absorption my be due to as mentioned by ***Mizrahi et al 1967*** .They reported that soy protein contain numerous polar side chain along with their peptide backbones there by making the protein hydrophilic, consequently the proteins absorbed water and tend to ration it in final food products, consequently in keeping them fresh longer as well as mixing time increased which recorded (1.5, 2.5 and 3.5 min) compared with control (1.0 min). The addition of 5, 10 and

15% defatted soy flour lead to increase dough development time which recorded 3.5 , 4.0 and 4.5 min respectively compared with control (2.0 min) on the contrary dough stability decreased which recorded (8.75, 8.50 and 7.50 min) compared with control (9min). Also the data dough weakening no changed between central and addition of 5 and 10% of defatted soy flour while addition of 15% lead to increase dough weakening which recorded 90 B.U compared with control (80 B.U). The results concide with those reported by ***Gonzalez - Agramon and Saldiver (1988).***

Table(10):Farinograph parameters of wheat flour (82% extraction) as affected by different levels of some substitutes.

Tested samples	water absorption %	mixing time (min)	Dough development (min)	Dough stability (min)	Dough weakening (B.U)
Control (wheat flour 82% extraction).	61.0	1.5	8.0	8.0	90
Fortification with wheat gluten levels.					
2 %	61.9	1.75	2.5	8.5	90
4%	63.0	2.00	2.5	9.5	80
6%	64.7	2.25	3.0	11.5	70
Fortification with corn gluten levels					
2 %	61.5	1.5	2.5	8.0	80
4%	62.5	1.5	3	7.5	90
6%	64.0	1.5	3	7.0	90
Fortification with casein levels.					
2%	62.0	1.5	3.0	7.0	100
4%	63.1	1.5	3.0	6.0	100
6%	64.6	1.5	3.0	6.0	100
Fortification with defatted soy flour levels					
5%	62.7	2	3.5	8	80
10%	66.6	2.5	3.5	7.5	90
15%	67.9	3.0	6.0	7.0	90



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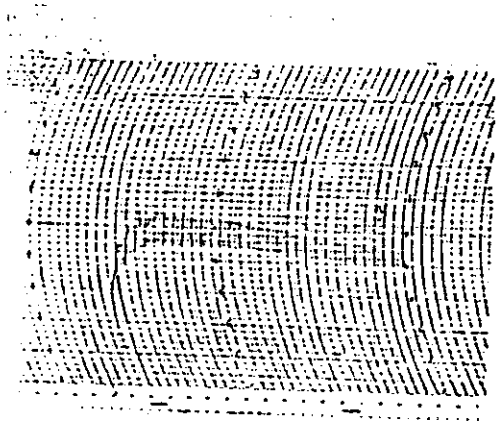

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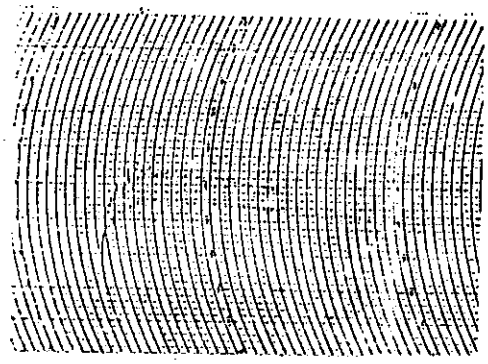

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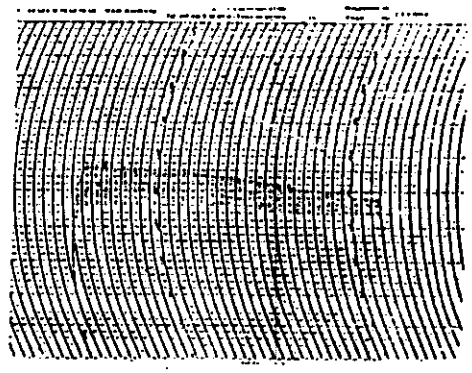


(4)

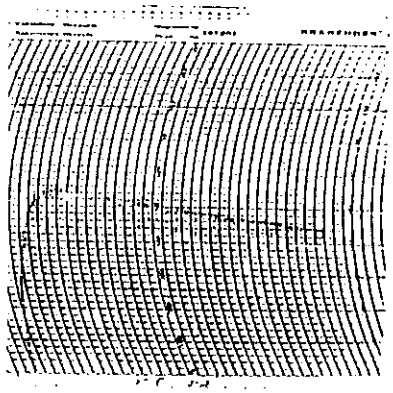
Figure (9)

1- Control .

2- Wheat flour (82%) + wheat gluten 2%

3- Wheat flour (82%) + wheat gluten 4%

4- Wheat flour (82%) + wheat gluten 6%



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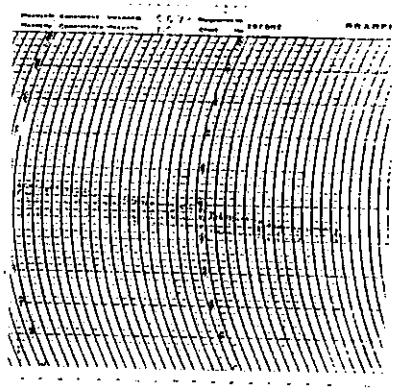

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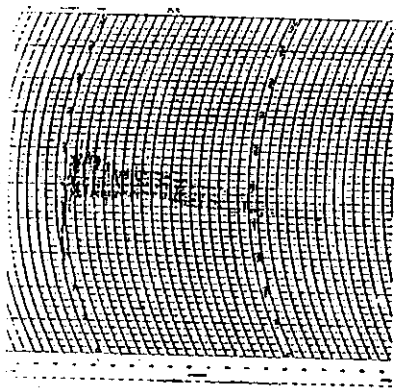

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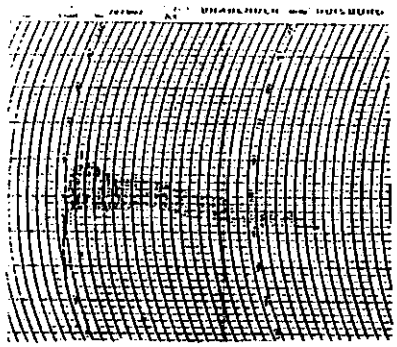


(4)

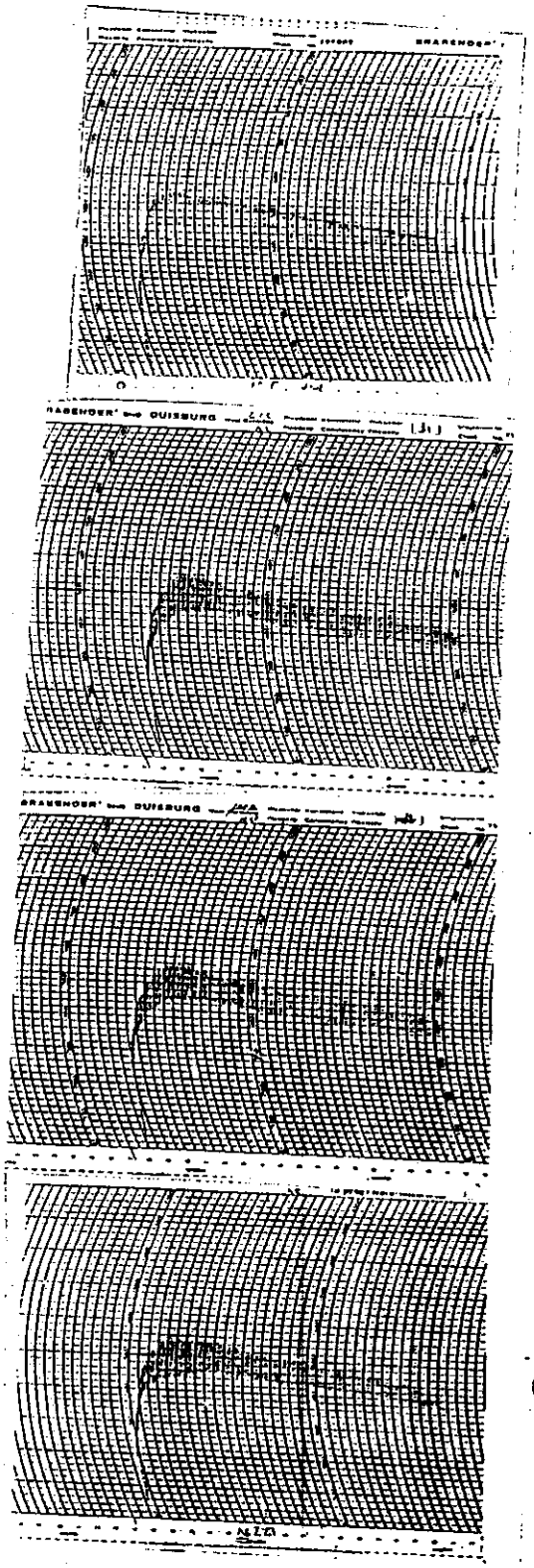
Figure (10)

1- Control .

2- Wheat flour (82%) + corn gluten 2%

3- Wheat flour (82%) + corn gluten 4%

4- Wheat flour (82%) + corn gluten 6%



(1)

(2)

(3)

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Figure (11)

1- Control

2- Wheat flour (82%) + casein 2%

3- Wheat flour (82%) + casein 4%

4- Wheat flour (82%) + casein 6%

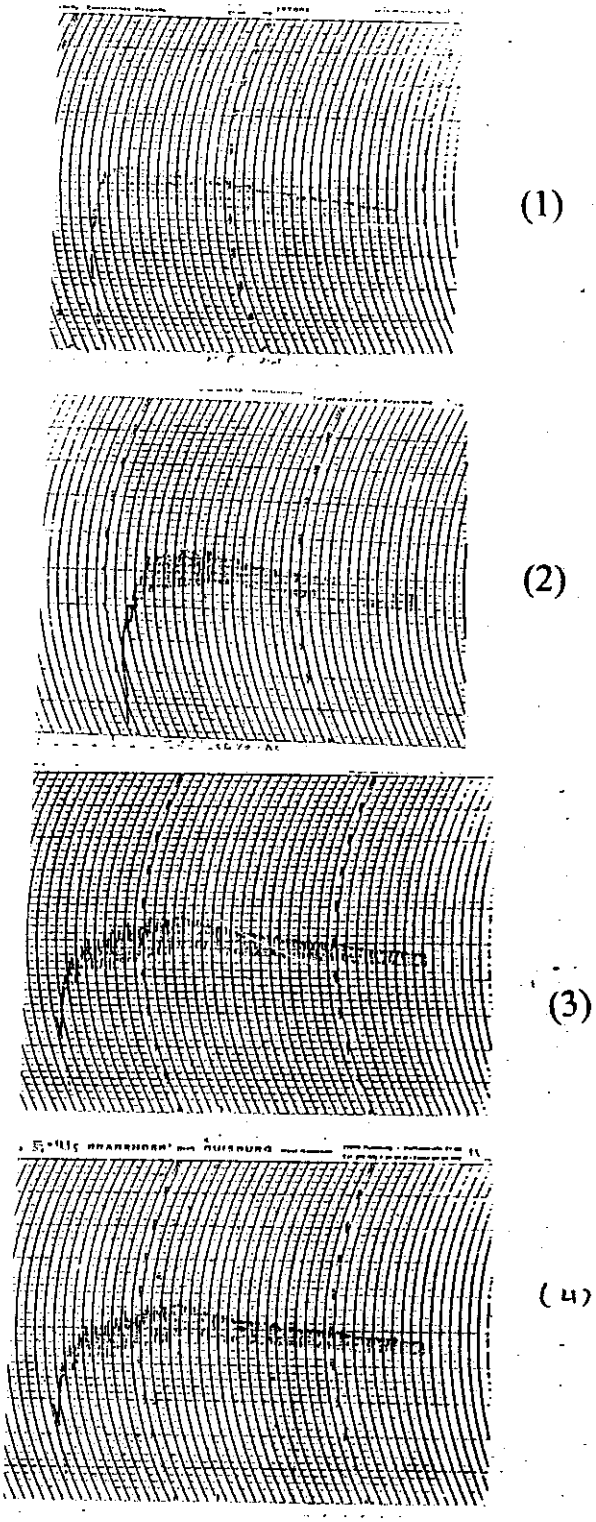


Figure (12)

1- Control
2- Wheat flour (82%) + defatted soy flour 5 %
3- Wheat flour (82%) + defatted soy flour 10%
4- Wheat flour (82%) + defatted soy flour 15 %

Effect of adding wheat gluten, corn gluten, casein and defatted soy flour to wheat flour (82% extraction on the rhealogical properties of dough.

Table (10) and figure (9 10, 11 , 12) should the farinograph parameters of wheat flour as effected by different levels of wheat gluten 2,4 and 6% corn gluten 2, 4 and 6% casein 2, 4 and 6% and defatted soy flour 5, 10 and 15 %.

Wheat flour 82% additive with different levels of wheat gluten :

The data in Table (10) and fig (9) showed that addition of wheat gluten at levels of 2,4 and 6% to wheat flour lead to increase water absorption which recorded (61.9, 63 and 64.7%) compared with control (1 %) . Also mixing time increased. It recorded (1.75, 2.0 and 2.25 min) respectively compared with control which recorded (1.5 min) concerning the dough development time there no change between control and addition 6% wheat gluten while addition of 2 and 4% wheat gluten respectively led to decreasing development time which recorded (2.5 and 2.5 min) respectively compared with control (3.0 min). On the contrary addition of wheat gluten to wheat flour increased dough stability which recorded (8.5, 9.5 and 11.5 min) respectively compared with control (8.0 ,min) . As well as the

data dough weakening no changed between control and addition of 2% wheat gluten while addition of 4 and 6% lead to decrease dough weakening which recorded with control(90 B.U.) These results were in agreement with those reported by ***Lasztity (1980).***

Wheat flour 82% subblemented with different levels of corn gluten

The data in Table (10) and figure (10) Showed that addition of corn gluten at level of 2., 4 and 6% to wheat lead to increase water absorption which recorded(61.5 , 62.5 and 64%)compared with control(61)concerning the mixing time no change between control and all addition levels. The addition of corn gluten at level 2% to wheat flour lead to decrease dough development time which recorded (2.5 min) compared with control. While development time no change between control and addition of 4 and 6% corn gluten. Also the dough stability no change between control and addition of 2% corn gluten while addition 4 and 6% corn gluten lead to decrease dough stability which recorded (7.5,7 min)and on the contrary the data dough weakening no changed between control and addition of 4 and 6%. Of corn gluten while addition of 2% lead to decrease dough weakening which recorded (80 B.U) compared with control (90 B.U). These results were in agreement with those reported by ***Abou-Raya (1980) and Hussein et al (1976).***

Wheat flour 82% fortified with different levels of casein

The data in Table (10) and figure (11) showed that addition of casein at level 2,4 and 6% to wheat flour lead to increase to water absorption while recorded (62.0 , 36.1 and 64.6%) compared with control (61 %) the mixing time no change between control and all addition levels. Also the dough development time no change between control and all addition levels concerning the addition of casein at levels 2,4 and 6% to wheat flour lead to decrease Dough stability which recorded (7, 6.5 and 6.5 min) respectively compared with control which recorded (8.0 min) on the contrary addition of casein to wheat flour lead to in cease weakening dough which recorded (100. B.U) at all addition. Compared with control which recorded (90 B.U). These results were similar with those obtained by ***Krik (1973) , living (1976) and Ravi at al (1991).***

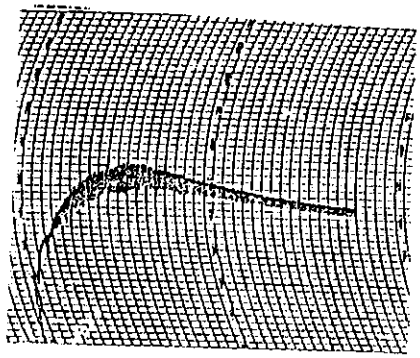
Wheat flour additive with different defatted soy flour :

The data in Table (10) and figure (12) showed that addition of defatted soy flour at levels of 5, 10 and 15 % to wheat flour lead to increase water absorption which recorded (62.7 , 66.6 and 67.8%) compared with control (60.8 %). As well as mixing time increased which recorded (2.0, 2.25 and 3.0 min) compared with control also the addition of 5, 10 and 15% defatted soy flour lead to increase dough development which recorded (3.5 , 3.5 and 6.0min) respectively compared with control (3.0 min). Concerning

the dough stability no change between control and addition of 5% of defatted soy flour while addition 10 and 15% defatted soy flour lead to decrease which recorded (7.5 and 7.0 min) respectively compared with control which recorded (80 min) . Also dough weakening no change between control and addition of 10 and 15% defatted soy flour while addition 5% defatted soy flour lead decrease dough weakening which recorded (80 B.U) compared with control (90 B.U). The results were in agreement with those reported by ***Yaseen (1985) and Hafez (1996).***

Table (11): Farniograph parameters of wheat flour 82% extraction mixed with 20% corn flour as a ffected by different levels of some substitutes.

Tested samples	water absorption %	mixing time (min)	Dough development (min)	Dough stability (min)	Dough weakening (B.U)
Control (wheat flour 82% extraction).	60.8	3.5	6	6.5	100
Fortification with wheat gluten levels.					
2 %	61.6	3.0	5.5	7.0	100
4%	62.8	2.5	2.5	9.0	80
6%	64.3	2.0	2.75	9.5	80
Fortification with corn gluten levels					
2 %	61.2	1.5	2.5	6	100
4%	62.3	2.0	3.0	5	110
6%	63.6	2.0	3.5	4.5	120
Fortification with casein levels					
2%	61.6	1.75	2.25	6.5	90
4%	62.7	1.75	2.25	6.0	90
6%	64.1	1.75	2.50	6.0	100
Fortification with defatted soy flour levels.					
5%	62.4	2.0	5	7.0	90
10%	66.1	2.25	3.25	6.5	100
15%	67.4	2.50	3.75	5.5	110



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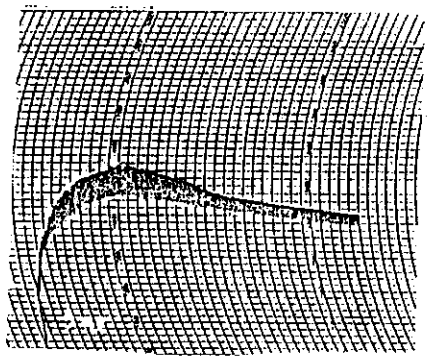

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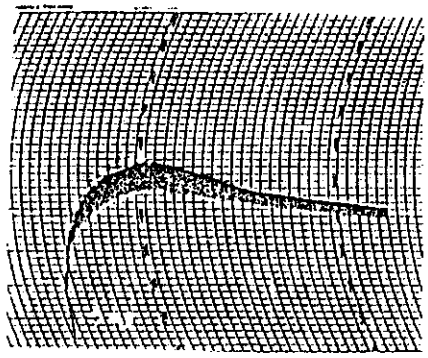

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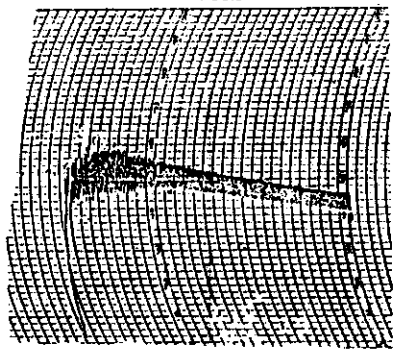


(4)

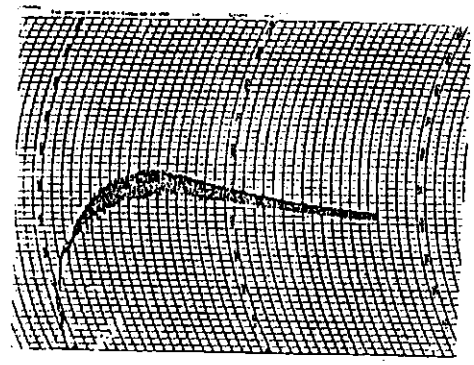
Figure (13)

1- Control

2- Wheat (82%) + corn flour + wheat gluten 2%

3- Wheat (82%) + corn flour + wheat gluten 4%

4- Wheat (82%) + corn flour + wheat gluten 6%



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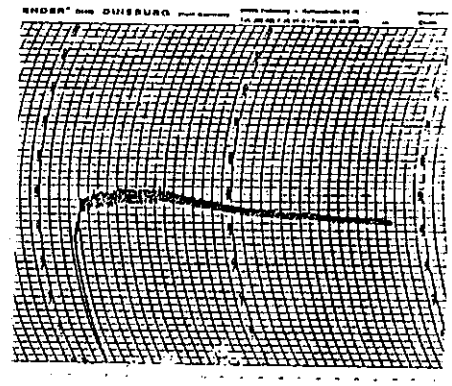

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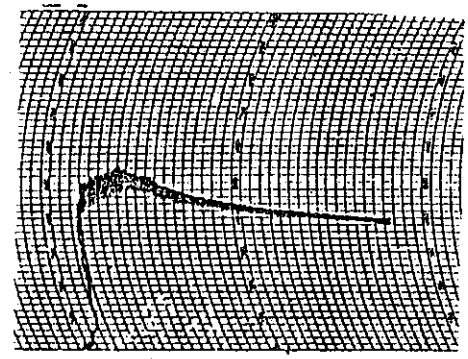

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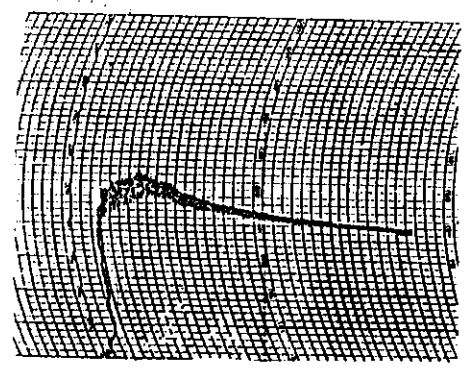


(4)

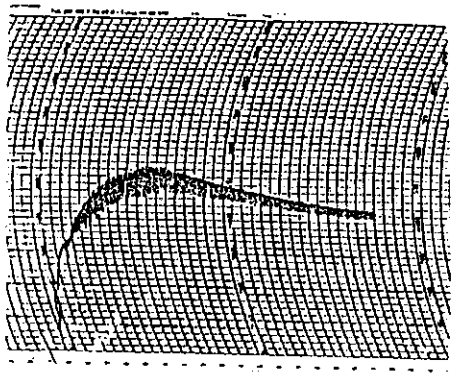
Figure (14)

1- Control

2- Wheat (82%) + corn flour + corn gluten 2%

3- Wheat (82%) + corn flour + corn gluten 4%

4- Wheat (82%) + corn flour + corn gluten 6%



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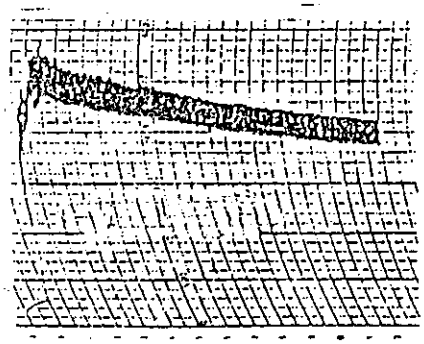

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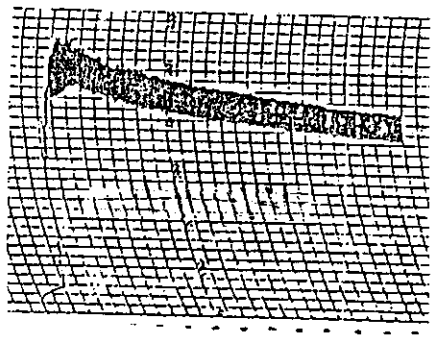

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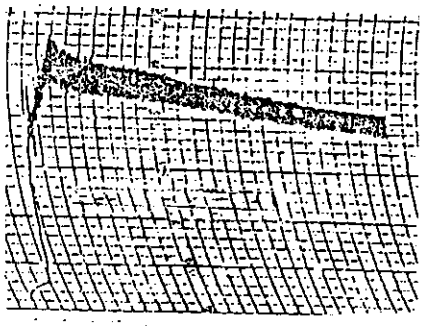


(4)

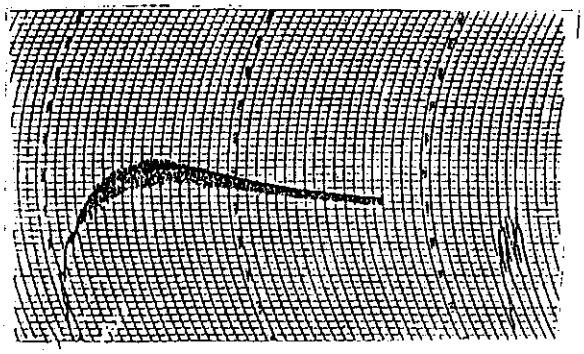
Figure (15)

1- Control

2- Wheat (82%) + corn flour + casein 2%

3- Wheat (82%) + corn flour + casein 4%

4- Wheat (82%) + corn flour + casein 6%



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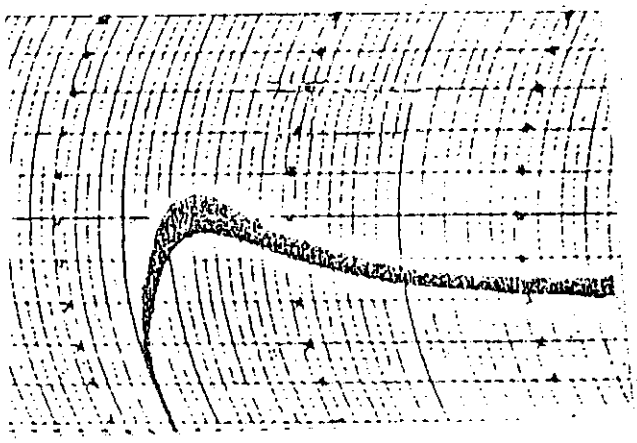

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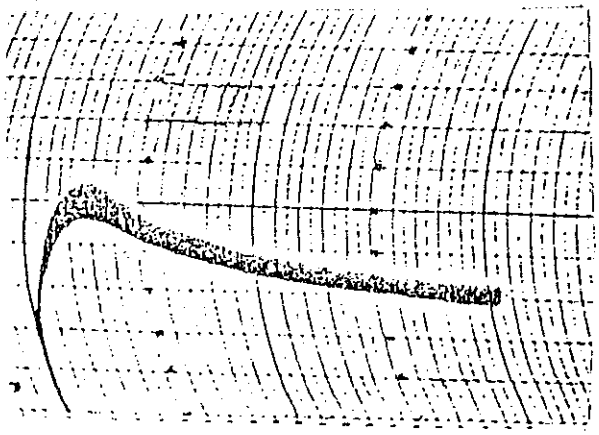

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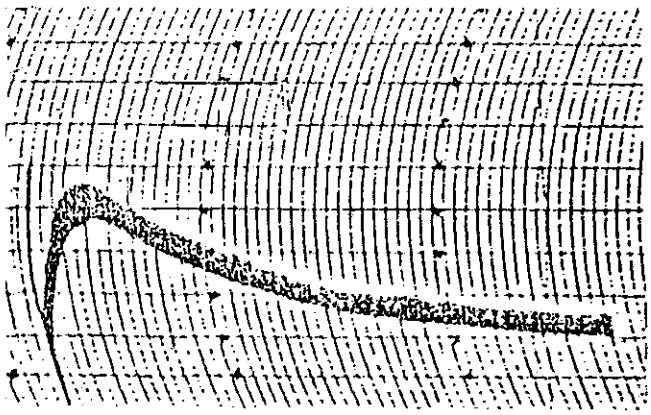

(4)

Figure (16)

1- Control

2- Wheat (82%) + corn flour + defatted soy flour 5%

3- Wheat (82%) + corn flour + defatted soy flour 10%

4- Wheat (82%) + corn flour + defatted soy flour 15%

Effect of adding wheat gluten , corn gluten, casein and defatted soy flour to wheat flour 82% mixed with 20% corn flour on the rheological properties of dough.

Table(11) and figure (13, 14 , 15, 16) showed the farinograph parameters of wheat flour as affected by different level wheat gluten 2, 4 & 6% corn gluten 2,4 & 6% casein 2.4 & 6% defatted soy flour 5, 10 & 15%.

Wheat flour mixed with corn flour and wheat gluten :

The data in Table (11) and figure (14) showed that addition of wheat gluten at levels of 2,4 and 6% to mixed flour lead to increase water absorption which recorded (61.6 , 62.8 and 64.3%) respectively compared with control (60.8 %) also mixing time decreased it recorded (3.0, 2.5 and 2.0 min). Concerning the dough development time decrease it recorded (5.5, 2.5 and 2.75 min) compared with control which recorded (6min) . As well as the addition of wheat gluten to mixed flour in creased dough stability which recorded (7,9 and 9.5 min) respectively compared with control(6.5 min) on the contrary dough weakening no changed between control and addition of 2% wheat gluten while addition of 4 and 6% lead to decrease dough weakening which recorded (80 and 80 B.U) respectively compared with control (100 B.U) . These results were similar with those obtained by ***lasztity (1980) , Roller and Tscheuschner (1989).***

Wheat flour mixed with corn flour additive with different levels of corn gluten

The data in Table (11) and figure (14) showed that addition of corn gluten at levels of 2,4 and 6% to mixed flour lead to increase water absorption which recorded (61.2 , 62.3 and 63.6 %) respectively compared with control (60.8%). Also mixing time decreased it recorded (1.5, 2, 2 min) respectively compared with control which recorded (3.5 min). As well as the addition corn gluten to mixed flour lead to decrease development time which recorded (2.5, 3 and 3.5 min) compared with control (6 min) . While the addition of corn gluten to mixed flour decreased dough stability which recorded(6,5 and 4.5 min.) As well as dough weakening no changed between control and addition of 2% corn gluten while addition of 4 and 6% lead to Increase dough weakening which recorded (100, 110 B.U) respectively compared with control (100 B.U) These result were in agreement with those reported by ***Hussein et al (1976) and Abou Raya (1980).***

Wheat flour mixed with corn flour sublmented with different levels of casein :

The data in Table (11) and figure (15) showed that addition of casein at levels of 2,4 and 6% to mixed flour lead to increase water absorption which recorded (61.6 , 62.7 and 64.1%) respectively compared with control (60.8%)Also mixing time decreased it recorded (1.75 min) at all levels addition compared with control which recorded (3.5 min). As well as the addition of casein to mixed flour decreased

dough development time it recorded (2.25, 2.25 and 2.5 min) respectively compared with control (6min) . While dough stability no changed between control and addition of 2% casein but addition of 4 and 6 % casein led to decrease dough stability which recorded (6 and 6 min) respectively on the contrary dough weakening no changed between control and addition of 6% casein while addition of 2,4% lead to decrease dough weakening which recorded (90 and 90 B.U) compared with control (100 B.U). These results were similar with those obtained by ***Sanchez et al (1984).***

Wheat flour mixed with corn flour additive with different levels of defatted soy flour :

The data in Table (11) and figure (16) showed that addition of defatted soy flour at level 5,10 an 15% to mixed flour led to increase water absorption which recorded (62.4, 66.1 and 67.4%) respectively compared with control also mixing time decreased which recorded (2. 2.25 and 2.5 min) respectively compared with control (3.5 min) the addition of 5,10 and 15% defatted soy flour lead to decrease dough development which recorded 5,3.25 and 3.75 min) respectively compared with control (6 min). Concerning dough stability no change between control and addition of 10% of defatted soy flour while addition 5% increase dough stability which recorded (7 min) compared with control (6.5min) but addition of 15% decrease dough stability which recorded (5.5 min) compared with control on the contrary addition of 5% defatted soy flour lead to decrease weakening dough

which recorded (90. B.U) compared with control . While addition of 10 and 15% defatted soy flour increase dough weakening which recorded (100 and 110 B.U) respectively compared with control. The results were in line with those obtained by ***Foda et al (1987).***

The results in Tables (9, 10, 11) 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 three 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 fibers led to more water absorption on adding corn gluten, corn flour and defatted soy flour .
c) Defatted soy flour contained numerous polar sidechains along with their peptide backbone thus making protein hydrophilic consequently the protein absorbed water and often retain it in final food products thereby Keeping these products frees for longer time .

Mixing time and dough development time lasted longer in wheat flour (82% extraction) and mixed flour (82% extraction) than wheat flour (72% extraction) . The three 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 wheat flour 72% . The decrease is due to

the fact the Fiber in wheat flour 82% extraction is higher that of wheat flour 72%.

However dough stability decreased at all addition levels in both 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 .

Table(12): Effect of fortification of wheat flour (72 extraction) by wheat gluten , corn gluten casein and defatted soy flour the extensograph test

Recipe mixtures		Dough extensibility (E.mm)	Resistance to extansion (R.BU)	Proportional number R/S	Dough energy (Cm^2)
Control		135	620	4.59	81.2
Wheat gluten	2%	150	640	4.3	115.5
Wheat gluten	4%	155	760	4.9	124
Wheat gluten	6%	160	780	4.8	204.5
Corn Gluten	2%	105	500	4.76	80.8
Corn Gluten	4%	110	480	4.4	75.2
Corn Gluten	6%	120	440	3.67	68.9
Casein	2%	110	760	6.91	79.9
Casein	4%	105	790	7.52	76.8
Casein	6%	100	820	8.2	67.6
Defatted soy floure	5%	125	440	3.52	80.5
Defatted soy floure	10%	120	520	4.33	61.3
Defatted soy floure	15%	115	580	5.04	54.7

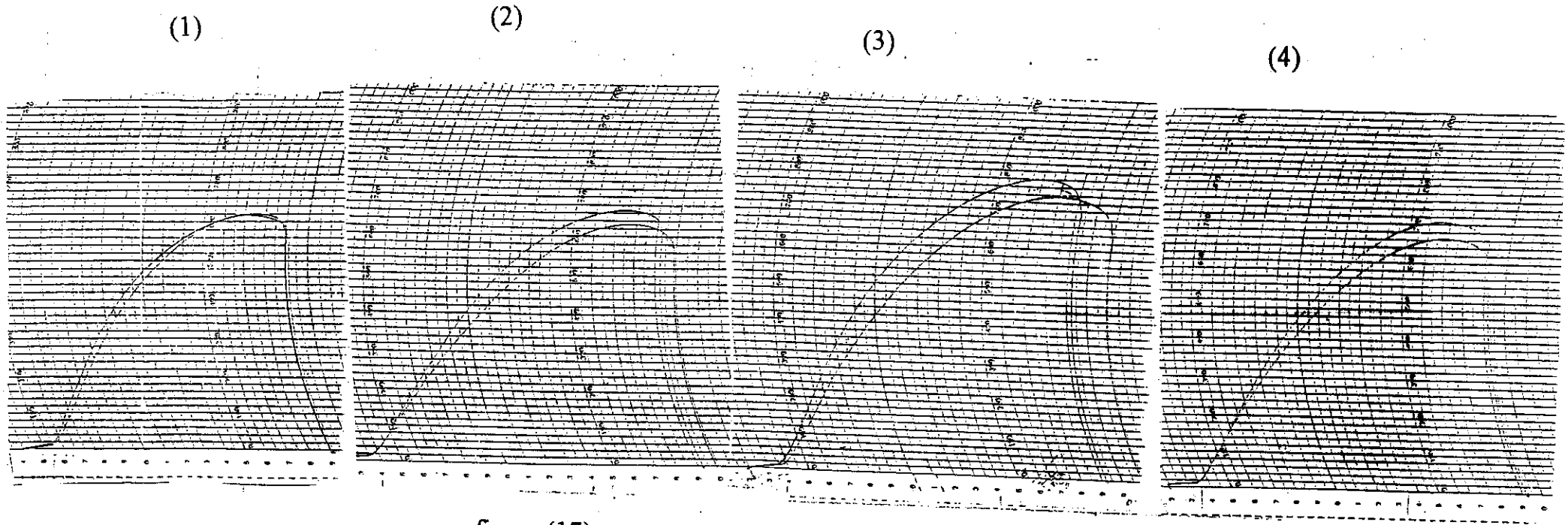

figure (17)

1- Control

2- Wheat flour (72%) + wheat gluten 2%

3- Wheat flour (72%) + wheat gluten 4%

4- Wheat flour (72%) + wheat flour 6%

(1) (2) (3) (4)

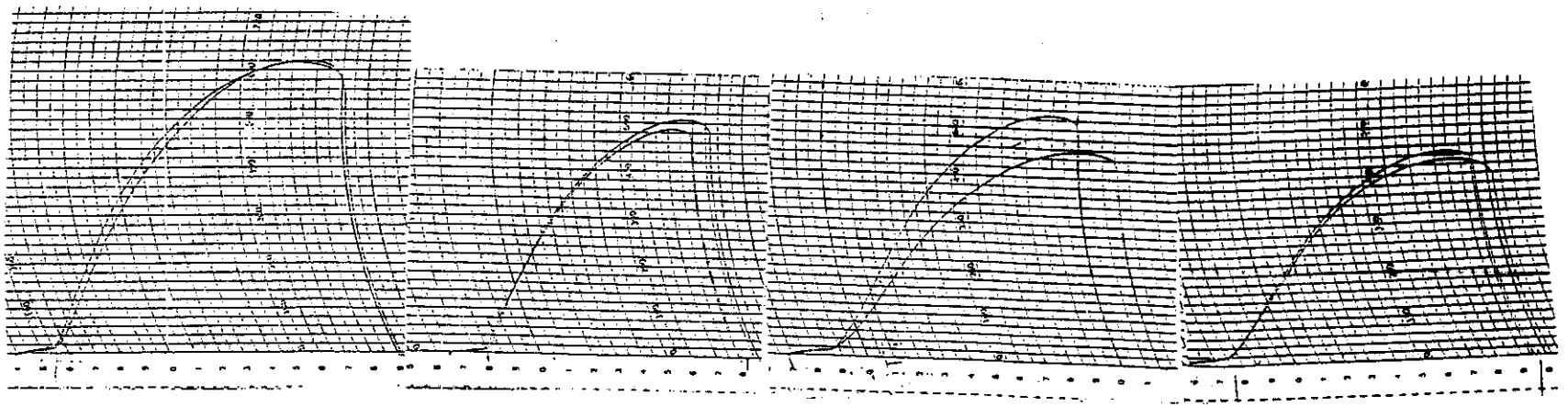

figure (18)

1- Control

2- Wheat flour (72%) + corn gluten 2%

3- Wheat flour (72%) + corn gluten 4%

4- Wheat flour (72%) + corn flour 6%

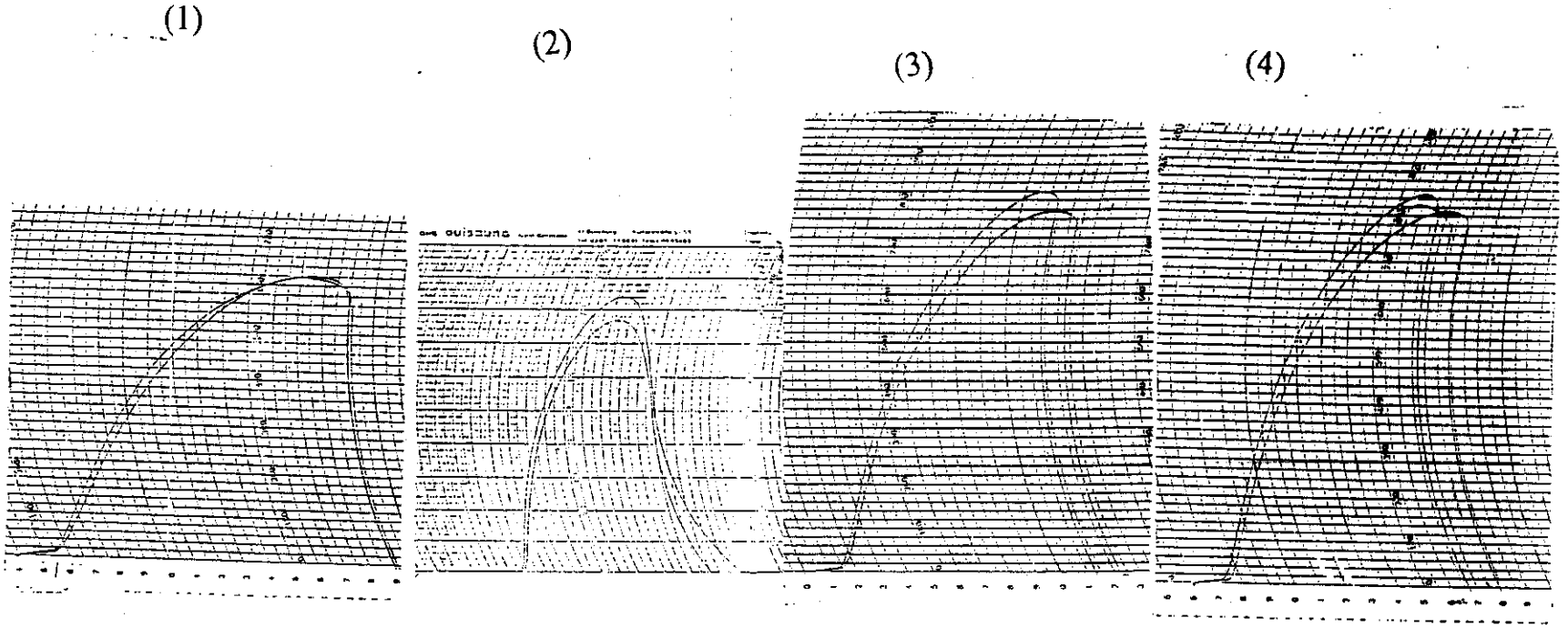

figure (19)

1- Control

2- Wheat flour (72%) + casein 2%

3- Wheat flour (72%) + casein 4%

4- Wheat flour (72%) + casein 6%

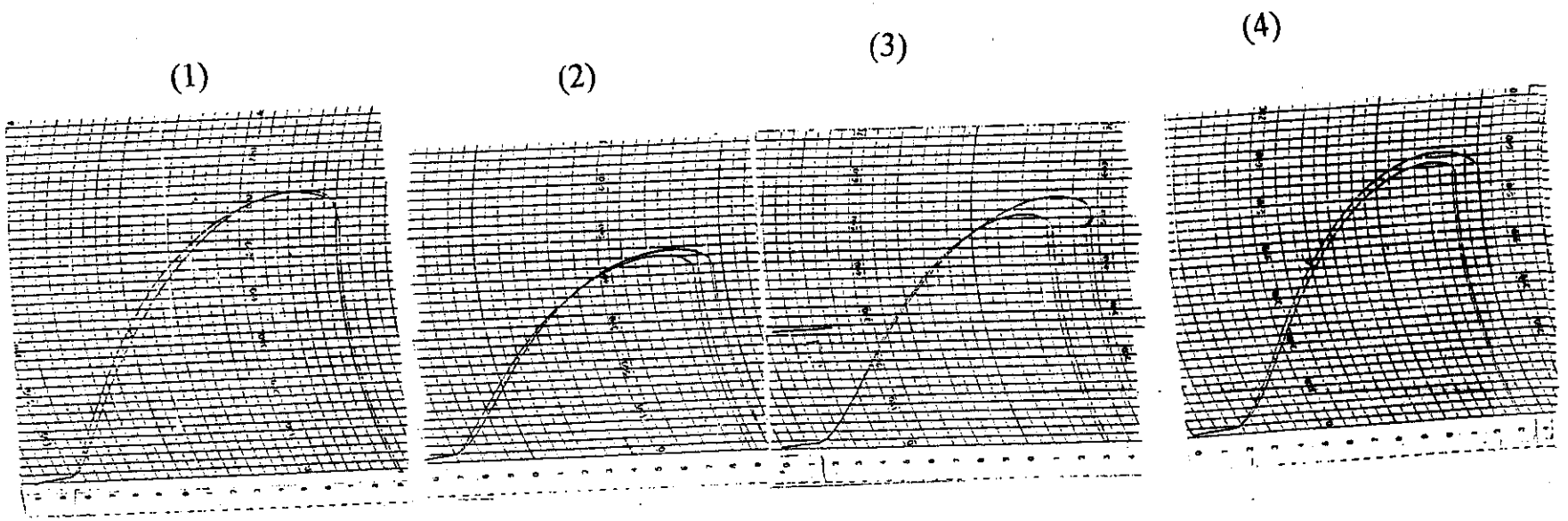

figure (20)

1- Control

2- Wheat flour (72%) + defatted soy flour 5%

3- Wheat flour (72%) + defatted soy flour 10%

4- Wheat flour (72%) + defatted soy flour 15%

Extensograph test

Table (12) and figures (17, 18, 19 , and 20) showed that Extensograph parameters of wheat flour 72% extraction as affected by different levels of wheat gluten corn gluten , casein 2, 4 and 6% and defatted soy flour 5, 10 and 15% .

Wheat flour fortified with different levels of wheat gluten

The data in Table (12) and figure (17) showed that addition of wheat gluten at levels 2, 4 and 6% to wheat flour increase dough extensibility which recorded (150, 155 , and 160mm) compared with contorl (135mm) .

As well as resistance to extension Increase which recorded to (640, 760 and 780 BU) compared with control which recorded (620B.U)

Respecting proportional number was recorded (4.3, 4.9 and 4.8) compared with control (4.59) .

On the other hand dough energy increase to (115.5, 124 and 204.5 cm^2) compared with control (81.2 cm^2) .

These results were in agreement with those reported by ***El Farra et al (1981)*** and ***Stauffer (1993)*** .

Wheat flour additive with different levels corn flour

The data in Table (12) and figure (18) showed that addition of corn gluten at levels of 2.4 and 6% to wheat flour decrease

dough extensibility which recorded (105, 110 and 120mm) compared with conrol (135mm) .

Also resistance to extension decrease to (500 , 480 and 440 B.U) Compared with control (620B.U) .

As well as proportional number was recorded (4.76, 4.4 and 3.67) compared with control (4.59)

On the other hand dough energy decrease to (80.8 , 75.2 and 68.9 Cm^2) compared with conrol (81.2 Cm^2) .

The result were in accordance with those reported were ***E.L Said and E.L Farra (1981).***

Wheat flour subblemented with different levels of casein

The data in Table (12) and figure (19) showed that addition of casein at levels of 2,4 and 6% to wheat flour decrease dough extensicility which recoreded (110 , 105 , and 100mm) compared with control (135 mm) .

On the other hand resistance to extension increase to (760, 790 and 820 B.U.) compared with control (620 B.U).

Respecting proportional number was recorded (6.91, 7.52 and 8.2) compared with control (4.59) concerning dough energy decrease to (79.9 , 76.8 and 67.6cm^2) compared with control (81.2 cm^2).

There results were similer with those obtained ***Ravi et al (1991) and Erdogdu (1995)*** .

Wheat flour fortified with different levels of defatted Soy floure

The data in Table (12) and (20) showed that addition of defatted soy flour at levels 5, 10 and 15% to wheat floure decrease dough extensibility which recorded (125, 120 and 115 mm) compared with control (135 mm) .

As well as resistance to extension decrease which recorded to (440, 520 and 540 B.U) compared with control (620 B.U)

Respecting proparitional number was recorded (3.52, 4.33 and 5.04) compared with control (4.59) .

On the other hand dough energy decrease to (80.5, 61.3 and 54.7 cm^2) compared with control (81.2cm^2) .

These results were in agreement with those reported by ***Foda et al (1987)*** .

Table (13): Effect of fortification of wheat flour (82% extraction) by wheat gluten , corn gluten casein and defatted soy flour on the extensograph test

Recipe mixtures	Dough extensibility (E.mm)	Resistance to extansion (R.BU)	Proportional number R/S	Dough energy (Cm^2)
Control	110	280	2.55	42.4
Wheat gluten 2%	115	320	2.78	64
Wheat gluten 4%	100	390	3.9	76
Wheat gluten 6%	90	460	5.11	74
Corn Gluten 2%	110	270	2.45	34.8
Corn Gluten 4%	115	260	2.26	30.2
Corn Gluten 6%	120	240	2.2	25.5
Casein 2%	105	280	2.7	53.1
Casein 4%	100	340	3.4	32.6
Casein 6%	95	390	4.11	30.2
Defatted soy floure 5%	55	290	4.27	28.6
Defatted soy floure 10%	50	320	6.4	22.4
Defatted soy floure 15%	50	340	6.8	18.5

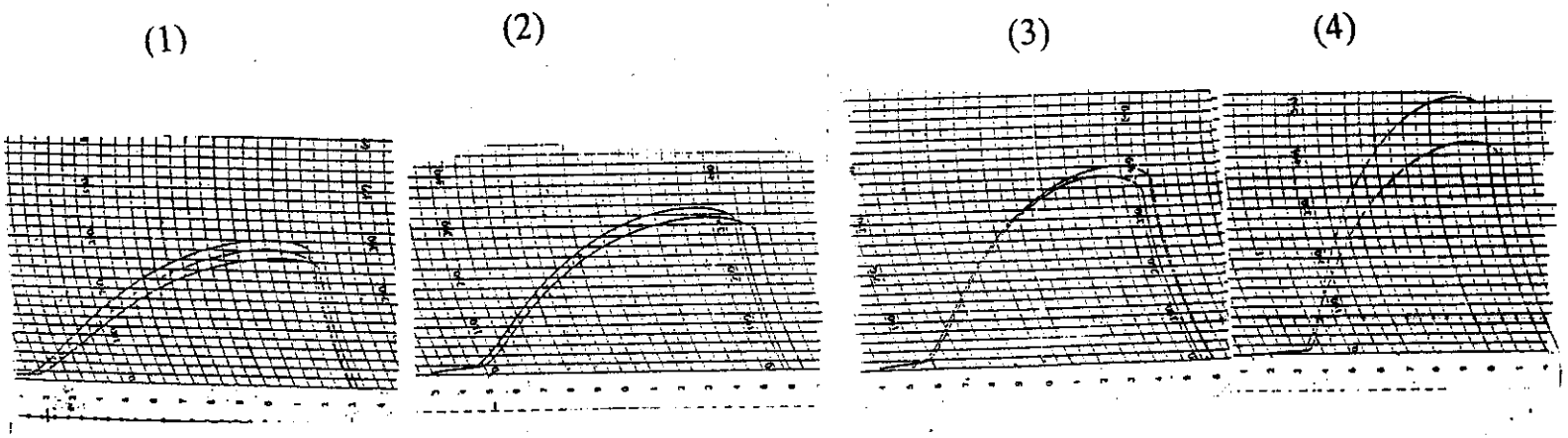

figure (21)

1- Control

2- Wheat flour (82%) + wheat gluten 2%

3- Wheat flour (82%) + wheat gluten 4%

4- Wheat flour (82%) + wheat flour 6%

(1) (2) (3) (4)

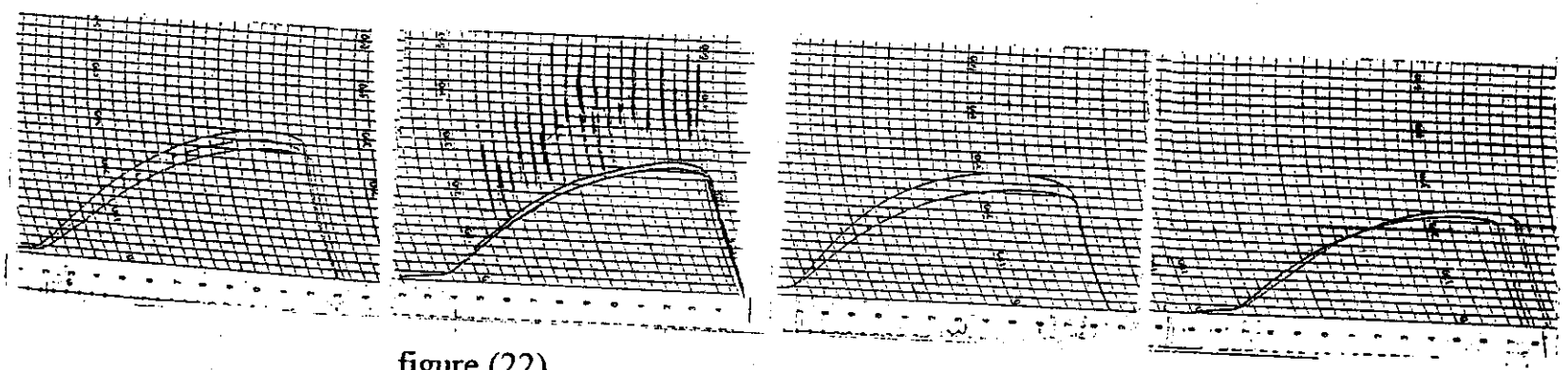

figure (22)

1- Control

2- Wheat flour (82%) + corn gluten 2%

3- Wheat flour (82%) + corn gluten 4%

4- Wheat flour (82%) + corn flour 6%

(1) (2) (3) (4)

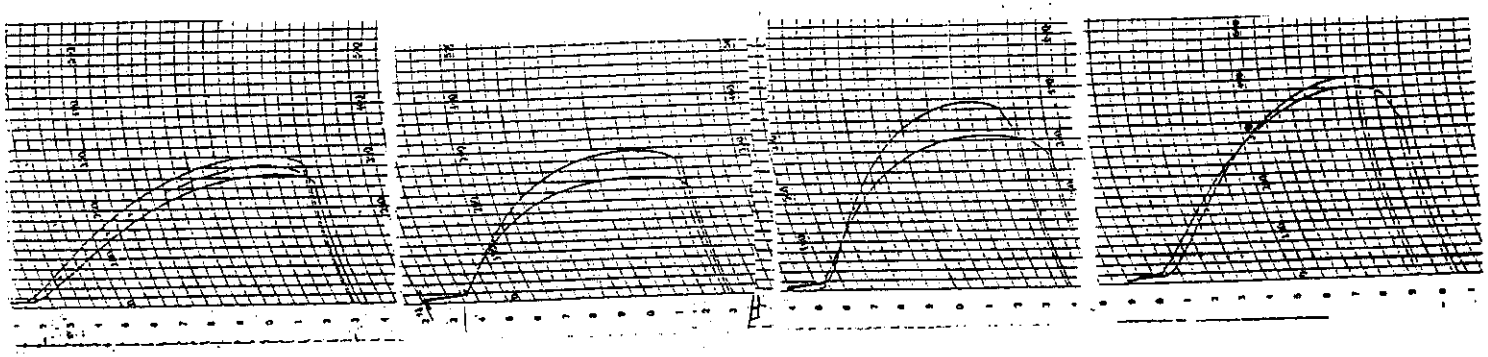

figure (23)

1- Control

2- Wheat flour (82%) + casein 2%

3- Wheat flour (82%) + casein 4%

4- Wheat flour (82%) + casein 6%

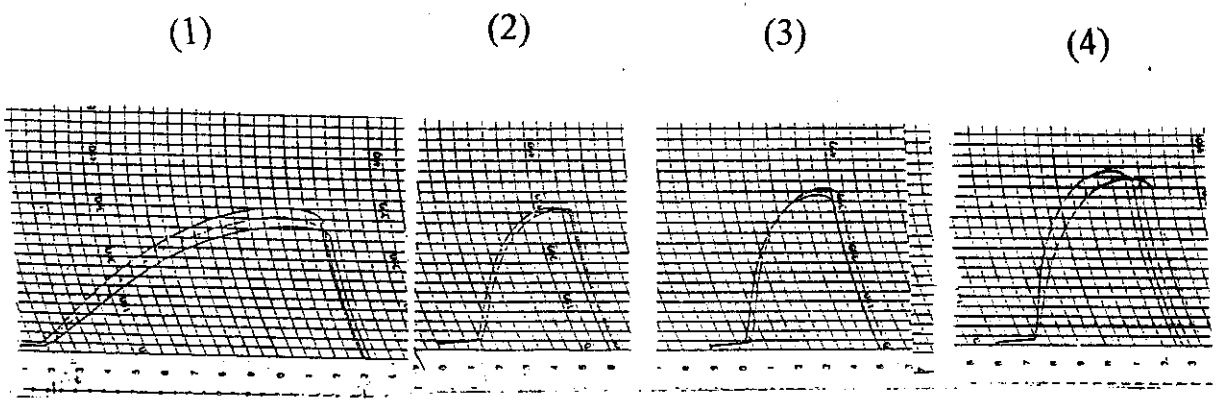

figure (24)

1- Control

2- Wheat flour (82%) + defatted soy flour 5%

3- Wheat flour (82%) + defatted soy flour 10%

4- Wheat flour (82%) + defatted soy flour 15%

Table (13) and figures (21, 22, 23 , and 24) showed the Extensograph parameters of wheat flour 82% extraction as affected by different levels of wheat gluten corn gluten , casein 2, 4 and 6% and defatted soy flour 5, 10 and 15% .

Wheat flour fortified with different levels of wheat gluten

The data in Table (13) and figure (21) showed that addition of wheat gluten at levels 2% to wheat flour increase dough extensibility which recorded (115mm) compared with contorl (110mm) while addition of 4 and 6% wheat gluten lead to decrease dough extensibility which recorded (100 and 90mm).

As well as resistance to extension Increase which recorded to (320, 390,and 460 BU) compared with control (280 B.U) .

Respecting proportional number was recorded (2.78, 3.9 and 5.11) compared with control (2.55) concerning dough energy increase (to 64, 76 and 74 cm^2) compared with control (42.4 cm^2)

The results were in a greatment with those reparted by ***Lasztity (190) and Dotsenko et al (1987)*** .

Wheat flour subblemented with different levels of corn Gluten

The data in Table (13) and figure (22) showed that addition of corn gluten at levels of 2,4 and 6% to wheat flour increased dough extensibility which recorded (110, 115, and 120 mm) respectively compared with control (110mm)

As well as resistance to extension decreas which reorded to (270 , 260 and 240B.U .)

Respecting proportional number was recorded (2.45, 2.26 and 2.2) compared with control (2.55) .

Concerning dough energy decrease to (34.8, 30.2 and 25.5 cm^2) compared with control which recorded (42.4 cm^2) .

These results were in agreement with those reporeted by ***Abou Raya (1980) and El- Said and ElFarra (1981).***

Wheat flour additive with different levels of casein :

The data in Table (13) and figure (23) showed that addition of casein at levels of 2,4 and 6% to wheat flour decrease dough extensicility which recoreded (105, 100 , and 95 mm) respectivly addition compared with control (110 mm) .

On the other hand resistance to extension no chanfed between control and addition of 2% casein while addition of 4 and 6% casein lead to increase resistance to extension which recorded to (340 and 390B.U) compared with control(280 B.U)

Respecting proportional number was recorded (2.7, 3.4, and 4.11) compared with control (2.55) .

Concerning dough energy decrease to (35.1 , 32.6 and 30.2cm^2) compared with control (42.4cm^2).

These results were similar with those obtained by ***E.l Farra et al (1981).***

Wheat flour subblmented with different of levels of defatted Soy floure

The data in Table (13) and (24) showed that addition of defatted soy flour at levels 5, 10 and 15% to wheat flour decrease dough extensibility which recorded (55, 50, 50 mm) compared with control which recorded (110 mm)

As well as resistance to extension increase which recorded to (290, 320 and 340 B.U) compared with control with recorded (280 B.U).

With respect to proportional number which recorded (4.27, 6.4 and 6.8) compared with control (2.55) .

On the other hand dough energy decrease when defatted soy flour was added at levels of 5. 10 and 15% which recorded (28.6 , 22.4 and 18.5 cm^2) . compared with control (42.4 cm^2)

These resulrs were in agreement with those reported by ***Yaseen (1985) , Hafez (1996) .***

Table (14): Effect of fortification of wheat flour (82% extraction + 20% corn flour Blends) by wheat gluten, corn gluten casein and defatted soy flour on the extensograph test

Recipe mixtures		Dough extensibility (E.mm)	Resistance to extansion (R.BU)	Proportional number R/S	Dough energy (Cm^2)
Control		105	160	1.52	19.2
Wheat gluten	2%	90	270	3	22.3
Wheat gluten	4%	100	300	3	33.7
Wheat gluten	6%	115	330	2.87	48
Corn Gluten	2%	90	260	2.89	16.1
Corn Gluten	4%	85	240	2.82	14.5
Corn Gluten	6%	75	240	3.02	12.3
Casein	2%	110	180	1.6	18.3
Casein	4%	100	190	1.9	16.6
Casein	6%	95	200	2.1	13.3
Defatted soy floure	5%	75	200	2.67	18.4
Defatted soy floure	10%	65	220	3.4	15.8
Defatted soy floure	15%	60	240	4	12.1

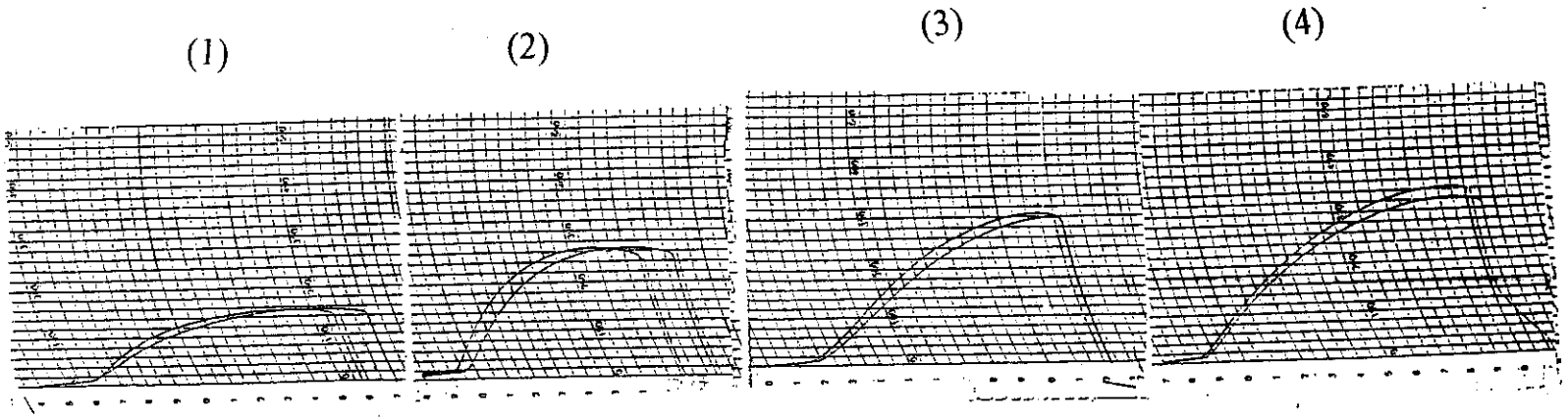

figure (25)

1- Control

2- Wheat flour (82%) + corn flour + wheat gluten 2%

3- Wheat flour (82%) + corn flour + wheat gluten 4%

40 Wheat flour (82%) + corn flour + wheat gluten 6%

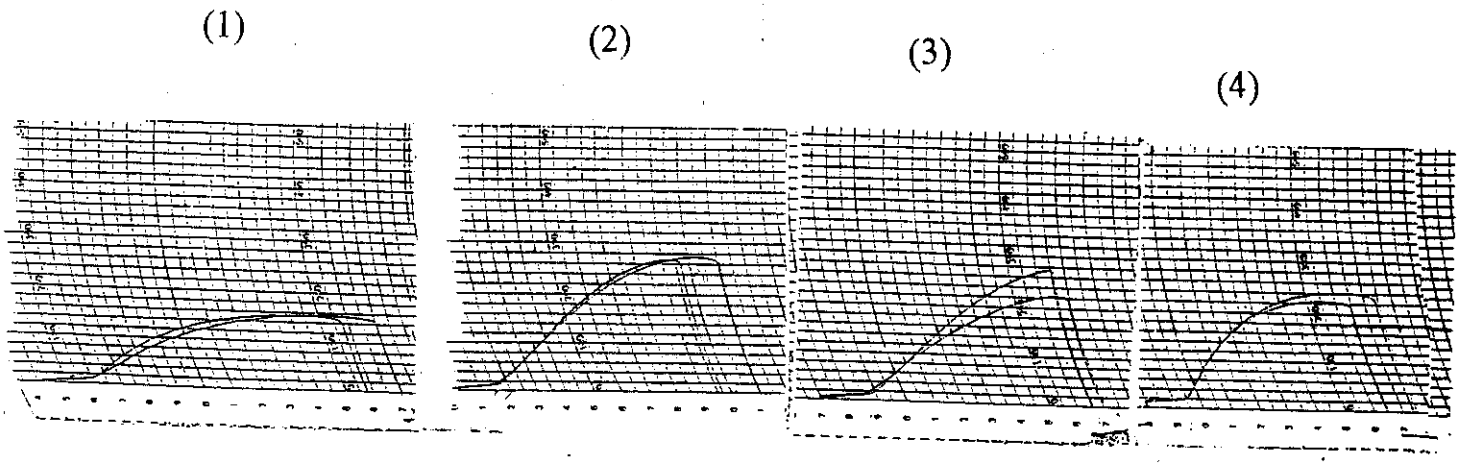

figure (26)

1- Control

2- Wheat flour (82%) + corn flour + corn gluten 2%

3- Wheat flour (82%) + corn flour + corn gluten 4%

4- Wheat flour (82%) + corn flour + corn gluten 6%

(1) (2) (3) (4)

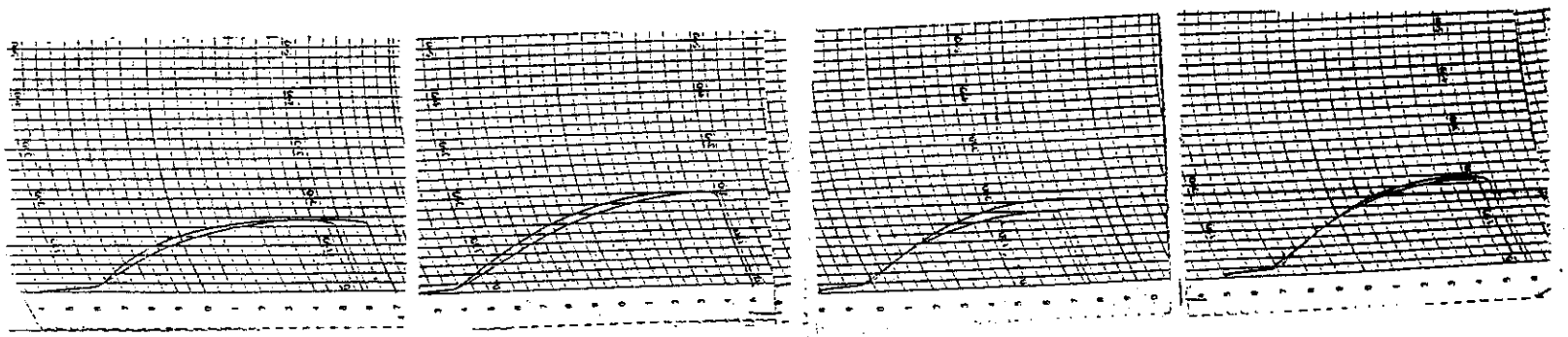

figure (27)

1- Control

2- Wheat flour (82%) + corn flour + casein 2%

3- Wheat flour (82%) + corn flour + casein 4%

4- Wheat flour (82%) + corn flour + casein 6%

(1) (2) (3) (4)

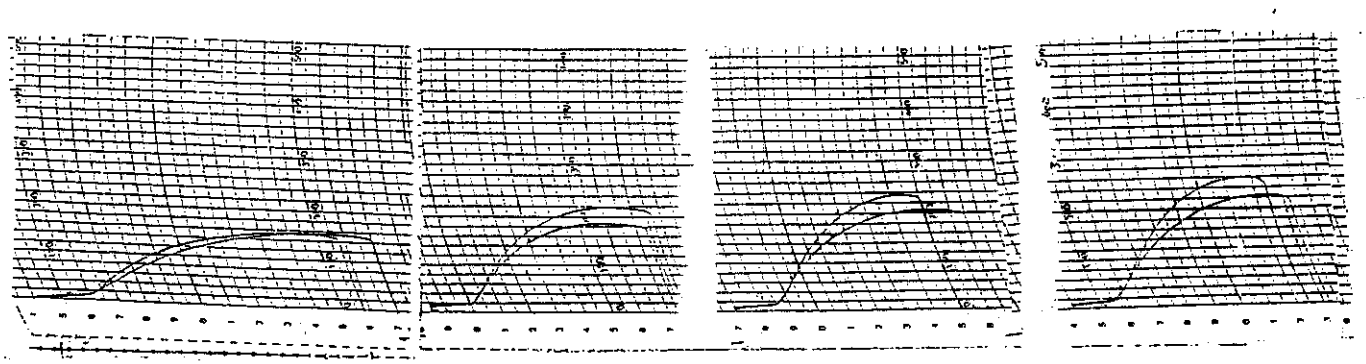

figure (28)

1- Control

2- Wheat flour (82%) + corn flour + defatted soy flour 5%

3- Wheat flour (82%) + corn flour + defatted soy flour 10%

4- Wheat flour (82%) + corn flour + defatted soy flour 15%

Table (14) and figures (25, 26, 27 , and 28) showed the Extensograph parameters of wheat flour 82% extraction mixed with 20 corn flour as affected by different levels of wheat gluten corn gluten , casein 2, 4 and 6% and defatted soy flour 5, 10 and 15% .

Wheat flour and corn flours blend subblemented with different levels of wheat gluten

The data in Table (14) and figure (25) showed that addition of wheat gluten at level 2and 4% to wheat flour mixed with corn flour lead to decrease dough extensibility which recorded (90 and 100 mm) compared with control (105mm) while addition of 6% wheat glutein lead to increase dough extensibility which recorded (115 mm) compared with control (105mm).

As well as resistance to extension Increase which recorded to (270, 300 and 330 BU) compared with control (160 B.U)

Respecting proportional number was recorded (3,3 and 2.87) concerning dough energy increase to (22.3, 33.7 and 48 cm^2) compared with control (19.2 cm^2)

These finding were in a line with these obtained by ***Roller and Tscheuschner (1980), and Shafek (1992)*** .

Wheat flour and corn flour fortified with different levels of Corn gluten

The data in Table (14) and figure (26) showed that addition of corn gluten at levels of 2,4 and 6% decreased dough

extensibility which recorded (90 , 85 and 75mm) compared with conrol (105mm) .

Also resistance to extension increase which recorded (260, 240 and 240 B.U) compared with control (160B.U) .

As well as resistance to extension Increase to 180, 190and 200 BU) compared with control (160 B.U0) .

Respecting proportional number was recorded (2.89 , 2.82 and 3.02) compared with control (1.52) .

Concerning dough energy decrease to (16.1, 14.5 and 12.3 cm^2) compared with control (19.2 cm^2) .

These resultd were similar with those obtained by ***Vringnoud (1977) and Erdogdu (1995).***

Wheat flour and corn flour blend subblimented with different of levels casein .

The data in Table (14) and figure (27) showed that addition of casein at level of 2 , 4% to mixed flour increase dough extensibility which recorded 110 and 100 mm) compared with control (105mm) .

As well as resistance to extension increase to (180, 190 and 200 B.U) compared with control (160. B.U). Respecting proporitional number was recorded (1.6 , 1.9 and 2.1) compared with control (1.52) concerning dough energy decrease to (18.3, 16.6 and 13.3 cm^3) compared with control (19.2 cm^2) .

These results were similar with those obtained by ***Vrignoud(1977) and Erdogdu (1995).***

Wheat flour and corn flour blend additive with different of levels deffated soy flour :

The data in Table (14) and figure (28) showed that addition of defatted soy flour at levels of 5 , 10, and 15 decrease dough extensicility as it recoreded (75, 65 and 60 mm) for levels of (5, 10 anf 15%) deffated soy flour added compared with control (105 mm) .

Also resistance to extension increase to (200, 220 and 240 B.U) compared with control (160 B.U)

As well as proportional number recorded (2.67, 3.4and 4) compared with conrol (1.52).

Concerning dough energy it decreased to (18.4, 15.8 and 12.1cm^2) compared with control (19.2cm^2).

These results were in agreement with those obtained by ***Yaseen (1985) and Hafez (1996)*** .

The results in Table (12.13.14) indicated that extensibility and resistance to extension in wheat flour (82% extraction) and wheat flour (82% extraction) mixed with 20% corn flour decrease 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 resistance to extension was not the some in all cases . However the results showed that these additions led to a decrease in energy at all addition levels.

Table (15): Mean values of the orgranolyptic evaluation of pan bread as affected by wheat gluten addition .

Properies	Score	control	Wheat flour 72 + Wheat gluten		
			2%	4%	6%
Extenal Properties	30				
Crust Color	10	8.5	9.5	10	9.0
Summetry of form	5	4.5	4.5	4.5	4.5
Evennes of back	5	4.5	4.5	4.5	4.5
Charter of crust	5	4.5	4.5	5	4.5
Break and shred	5	4.0	4.5	5	3.5
Internal properties	70				
Crumb Color	10	9.5	9.5	9.5	9.5
Texture	15	14	14.5	15	14.5
Grain	15	9	9.5	9.5	9
Taste	20	19	19	19.5	19
Flavor	15	14	14.5	14.5	14.5
Over acceptability	100	91.5	94.5	97	92.5

Organleptic evaluation of pan bread

Pan bread supplemented with 2,4 and 6% wheat gluten .

The data in Table (11) showed that there were significant between pan bread supplemented with wheat gluten and control in both internal and external properties at the addition levels. On the other hand over all accepatbility recorded 91.5 at control while it increased to 94.5, 97 and 92.5 . at the levels 2,4 and 6% of wheat gluten. It is also noted that the best result was achieved at the addition level of 4% .

These results were in accordance with thcse obtained by ***MacRitchie et al(1991)*** .

Table (16): Mean values of the organolyptic evaluation of pan bread as affected by corn gluten additive.

Properties	Score	Control	wheat flour + corn gluten		
			2%	4%	6%
External properties	30				
Crust color	10	8.5	8.0	7.0	6.5
Summetry of form	5	4.5	4.0	4.0	3.5
Evens of bake	5	4.5	4.0	3.0	2.5
Charter of crust	5	4.5	4.5	4.0	3.5
Break and shred	5	4.0	4.0	3.5	3.0
Internal properties	70				
Crumb color	10	9.5	9.0	8.0	6.5
Texture	15	14	13	12	10.5
Grain	10	9	8.5	8.0	7.5
Taste	20	19	18.5	17.0	16.0
Flavor	15	14	13.5	13	12.0
Overall acceptability	100	91.5	87	79.5	71.5

Pan bread supplemented with 2.4 and 6% corn gluten

The data in Table(16) showed that there were remarkable differences between pan bread supplemented with corn gluten and control in internal and external properties at the addition levels 2,4 and 6% on the contrary over all acceptability decrease to 87 , 79.5 and 71.5 at the level of 2.4 and 6% respectively compared with control 91.5 it is noted that the best results was achieved at the addition level of 2%. These mentioned results were coincide with those reported by ***Stauffer (1993).***

Table 17 : Mean values of the organolyptic evaluation of pan bread as affected by casein additive .

Properties	Score	Control	wheat flour + Casein		
			2%	4%	6%
External properties	30				
Crust color	10	8.5	9.5	9.5	9.5
Summetry of form	5	4.5	4.5	4.5	4.5
Evens of bake	5	4.5	4.0	4.0	4.5
Charter of crust	5	4.5	4.0	5.0	4.0
Break and shred	5	4.0	4.0	4.0	4.0
Internal properties	70				
Crumb color	10	9.5	10	10	10
Texture	15	14.0	14.0	14.0	14.0
Grain	10	9.0	9.0	9.0	9.0
Taste	20	19.0	19.0	19.0	18.0
Flavor	15	14.0	14.0	14.0	14.0
Overall acceptability	100	91.5	92	93	91.5

Pan bread supplemented with 2.4 and 6% casein

The data in Table (17) manifested that there were significant differences between pan bread supplemented with casein and control in both internal and external properties at the addition levels 2,4 and 6% concerning over all acceptability recorded 91.5 at control , where as it increased to 92 and 93 at the level 2 and 4% on the contrary over all acceptability decrease to 91.5 at the level 6% of casein is also noted that best result was achieved at the addition level of 4%. These results were agreement with those reported by ***Krik (1973) and Living et al (1976).***

Table (18): Mean values of the organolyptic evaluation of pan bread as affected by defatted soy flour additive.

Properties	Score	Control	wheat flour + Defatted soy flour		
			5%	10%	15%
External properties	30				
Crust color	10	8.5	9.0	8.0	7.0
Summetry of form	5	4.5	4.0	4.0	4.0
Evens of bake	5	4.5	4.0	4.5	3.5
Charter of crust	5	4.5	4.0	4.5	4.0
Break and shred	5	4.0	4.0	3.5	3.0
Internal properties	70				
Crumb color	10	9.5	9	8	7.5
Texture	15	14	13	12	11
Grain	10	9	8.5	8	7.5
Taste	20	19	19	18	17
Flavor	15	14	14	13	12
Overall acceptability	100	91.5	88.5	83.5	76.5

Pan bread supplemented with 5 , 10 and 15% defatted soy flour.

The data in Table(18) indicated that there were remarkable differences between pan bread supplemented with defatted soy flour and control in internal and external properties at the addition levels 5,10 and 15%. On the other hand over all acceptability recorded 91.5 at control. While it decrease to 88.5 , 83.5 and 76.5 at the level 5,10 and 15% of defatted soy flour. It also noted that the best result was achieved at the addition level of 5%. These results were in line with those obtained by ***Schafer(1984)*** .

Table (19): Mean values of the organolyptic evaluation of balady bread as affected by wheat gluten additive

Properties	Score	Control	wheat gluten		
			2%	4%	6%
Loaf rising	10	9.0	9.5	9.5	9.0
Crust quality	10	9.0	9.0	9.5	9.5
Crust color	10	9.0	9.0	9.0	9.0
Crumb uniformity	10	9.0	9.5	9.5	9.0
Crumb color	25	23.5	23.5	24.0	23.5
Odor	10	9.0	9	9.0	9.0
Taste	25	24.0	24.0	24.0	24.0
Over all acceptability	100	92.5	93.5	94.5	93

Organolyptic evaluation of balady bread .

Balady beard supplement with 2,4 and 6% wheat gluten.

The data in Table (19) indicated that supplementation of balady bread with wheat gluten resulted in importuning its properties , loaf rising , crust quality, crust color , crumb uniformity, crumb color odor and taste as compared with control. It also showed that over all acceptability recorded 93.5 , 94.5 and 93 at the levels 2,4 and 6% respectively while control recorded 92.5. The best result achieved was at the addition level of 4%.The above mentioned results were in harmony with those obtained by ***Anderson and Vojnovich (1962). and Hale and Carlson (1969) .***

Table (20): Mean values of the organolgptic evaluation of balady bread as effected by corn gluten additive

Properties	Score	Control	corn gluten		
			2%	4%	6%
Loaf rising	10	9.0	9.0	8.5	8.0
Crust quality	10	9.0	9.0	8.5	8.5
Crust color	10	9.0	8.5	8.0	7.0
Crumb uniformity	10	9.0	9.0	8.5	8.5
Crumb color	25	23.5	22.0	20.0	18.5
Odor	10	9	8.5	8.0	7.0
Taste	25	24.0	23.5	22.5	21.0
Over all acceptability	100	92.5	89.5	84	78

Organolyptic evaluation of balady bread supplemented with 2,4 and 6% corn gluten.

The data in Table (20) showed that supplementation of balady bread with corn gluten resulted in improving its properties, loaf rising, crust quality, crust color, crumb uniformity, crumb color, odor and taste as compared with central. Concerning over all acceptability recorded 91.5 at control while it decrease to 89.5 84 and 87 at the levels 2,4 and 6% respectively it is also showed that the best result was achieved at the addition level of 2%. These finding were in line with those obtained by ***El-Saied and El-Farra (1981).***

Table (21) Mean values of the organolyptic evaluation of Balady bread as affected by casein additive.

Properties	Score	Control	Casein		
			2%	4%	6%
Loaf rising	10	9.0	9.5	9.0	9.0
Crust quality	10	9.0	9.0	9.0	9.0
Crust color	10	9.0	9.0	9.5	9.5
Crumb uniformity	10	9.0	9.0	8.5	8.0
Crumb color	25	23.5	24.5	24.5	24.0
Odor	10	9	9.0	9.0	9.5
Taste	25	24.0	24.0	24.5	24.0
Over all acceptability	100	92.5	94	94	93

Pan bread supplemented with 2.4 and 6% casein .

The data in Table (21) manifested that supplementation of balady bread with casein resulted in improving. Its properties, loaf rising, crust quality, crust color crumb uniformity, crumb color, odor and taste as compared with control It also noted that over all acceptability increased to 94,94 and 93 compared with control which recorded 92.5 The best result achieved was at the level 2 and 4%. The above mentioned results were in harmony with those obtained by ***Titcomb and Juers (1977) and Vrignaud (1977).***

Table (22): Mean values of the organolyptic evaluation of Balady bread as affected by defatted soy flour additive.

Properties	Score	control	Defatted soy flour		
			2%	4%	6%
Loaf rising	10	9.0	9.0	8.0	7.5
Crust quality	10	9.0	9.0	8.5	8.0
Crust color	10	9.0	9.0	9.0	8.5
Crumb uniformity	10	9.0	9.0	8.5	8.5
Crumb color	25	23.5	23.0	22.0	21.0
Odor	10	9	9.0	8.0	7.0
Taste	25	24.0	24.0	23.0	23.0
Over all acceptability	100	92.5	92	87	83.5

Balady bread supplemented with 5,10 and 15% defatted soy flour.

The data in Table (22) manifested that supplementation of balady bread with defatted soy flour resulted in improving . Its properties loaf rising, crust quality, crustust color crumb uniformity , crumb color , odor and taste as compared with control. It also showed that over all acceptability decrees to 92,87 and 83.5 comprised with control 92.5 . The best result achieved was at the level 5%. These results were in accordance with those obtained by ***Foda et al (1984) and Clark and proctor (1994).***

Table (23) Mean values of the organolyptic revaluation of balady bread (Wheat flour 82% extraction + corn flour as affected by Wheat gluten additive

Properties	Score	Control	Wheat flour+ 20% corn flour + wheat gluten		
			2%	4%	6%
Loaf rising	10	8.0	8.5	9.0	9.5
Crust quality	10	8.0	8.5	9.0	9.5
Crust color	10	8.5	8.5	8.5	9.0
Crumb uniformity	10	8.0	8.5	9.5	9.5
Crumb color	25	23.0	23.0	23.5	24.0
Odor	10	9	9.0	9.0	9.0
Taste	25	23.5	23.5	23.5	23.5
Over all acceptability	100	88	89.5	92	94

Organolyptic evaluation of balady bread (wheat flour mixed with corn flour)

Balady bread supplemented with 2,4 and 6% wheat gluten.

The data in Table (23) showed that supplementation of balady with what gluten resulted in improving its properties loaf rising crust quality , crust color,crumb uniformity, crumb color, odor and taste as comp ard with control .It also noted that over all acceptability recorded 89.5, 91 and 94 at the level 2,4 and 6% while control recorded 88 the best result achieved was at the addition level of 6%. These mentioned results were coincide with those reported by ***Hal end Carlson (1969) and MacRitchie et al (1991).***

Table (24): Mean values of the organolyptic evaluation of Balady bread (wheat flour 82% + corn flour as affected by corn gluten additive.

Properties	Score	Control	corn gluten		
			2%	4%	6%
Loaf rising	10	8.0	8.5	8.0	7.5
Crust quality	10	8.0	5.5	8.0	8.0
Crust color	10	8.5	8.5	7.5	7.0
Crumb uniformity	10	8.0	8.0	7.5	7.5
Crumb color	25	23.0	21.5	20.5	18.5
Odor	10	9.0	8.5	7.5	8.5
Taste	25	23.5	23.0	22.0	20.5
Over all acceptability	100	88	83.5	81	77.5

			2%	**4%**	**6%**
Loaf rising	10	8.0	8.0	7.5	7.0
Crust quality	10	8.0	8.0	8.0	7.5
Crust color	10	8.5	8.5	8.5	8.5
Crumb uniformity	10	8.0	5.0	8.5	8.0
Crumb color	25	23.0	23.5	24.0	24.0
Odor	10	9	8.5	8.5	8.5
Taste	25	23.5	23.5	23.5	23.5
Over all acceptability	100	88	85	88.5	87

Balady bread supplemented with 2,4 and 6% casein.

The data in Table (25) showed that supplementation of balady bread with casein resulted in improving its properties , loaf rising , crust quality , crust color crumb uniformity crumb color, odor and taste compared with control. It also noted that over all acceptability decreased to 85 and 87 at the level 2 and 6% compared with control 88. The best result achieved was at the level 4%. These results were in accordance with those obtained by ***Oisansky et al (1971) and Titcomb and Juress (1977).***

Table (26): Mean values of the organolyptic evaluation of balady bread (wheat flour 82% + 20% corn flour) as affected by defatted soy flour.

Properties	Score	Control	corn gluten		
			2%	4%	6%
Loaf rising	10	8	8.0	7.5	7.0
Crust quality	10	8	8.0	8.0	7.5
Crust color	10	8.5	8.5	8.5	8.0
Crumb uniformity	10	8.0	8.0	8.0	8.0
Crumb color	25	23.0	22.5	21.5	20.5
Odor	10	9.0	8.5	7.5	7.0
Taste	25	23.5	23.5	23.0	22.5
Over all acceptability	100	88	87	84	80.5

Balady bread supplemented with 5,10 and 15% defatted soy flour

The data in Table (26) indicated that supplementation of balady bread with defatted soy flour resulted in improving its properties loaf rising , crust quality, crust color, crumb uniformity, crumb color odor, and taste compared with control. It also noted that over all acceptability decreased to 87,84 and 80.5 compared with control 88. The best result achieved was at the level 5%. These results were in agreement with those rebooted by ***Clark and proctor (1994) and Hafez (1996).***

Table (27):Chemical composition of pan bread fortified with different levels of wheat gluten

Chemical compostion	Control %	wheat gluten level 2%	4%	6%
Crude protein	11.885	13.37	14.85	16.33
Crude fat	0.8	0.8	0.876	0.914
Crude fiber	0.727	0.733	0.739	0.745
Ash content	0.73	0.73	0.754	0.766

Chamical compoition of pan bread fortified with wheat gluten.

The data in Table (27) showed that addition of wheat gluten to wheat flour increased the content of protein, crude fat , crude fiber and ash in pan bread. Adding 2,4 and 6% of wheat gluten increased protein contrent recorded (13.37, 14,85 and 16.33%) respectively compared with control in which protein content recorded 11.885%. These results were in agreement with those reported by ***Anderson and Vojnovich (1962) and Abd El latef (1990).***

Table (28) :Amino acid content of pan bread fortified with different levels of wheat gluten (g/100 g protein)

Amino Acids gm/100gm. Protein	Conrtol	Wheat gluten level		
		2%	4%	6%
Aspartic	0.392	0.443	0.494	0.546
Threonine *	0.316	0.4	0.42	0.448
Serine	0.449	0.516	0.582	0.649
Glutamic	4.216	4.701	5.186	5.671
Proline	0.879	1.1	1.322	1.543
Glycine	0.427	0.479	0.53	0.582
Alanine	0.384	0.427	0.469	0.512
Cysteine	0.516	0.566	0.607	0.626
Valine *	0.499	0.562	0.624	0.687
Methionine *	0.055	0.150	0.173	0.195
Iso-Leucine *	0.479	0.54	0.56	0.592
Leucine *	0.685	0.89	1.008	1024
Tyrosine	0.195	0.24	0.285	0.33
Phenylalanine *	0.61	0.693	0.777	0.86
Histidine *	0.284	0.324	0.364	0.403
Lysine *	0.118	0.141	0.173	0.186
Arginine *	4.716	4.768	4.82	4.872
Tryptophan *	0.075	0.089	0.102	0.110

* E.A.A

Amino acid content of pan bread fortified with wheat gluten.

Data in Table (28) showed that addition of wheat gluten to wheat flour increased the amino acid content in pan bread at the level 2,4 and 6% it also showed an increase of essential amino acids and non essential amino acids compared with control. Adding wheat gluten in creased lysine content to (0.141, 0.173 and 0.186 (g/100g protein) compared with contol which recorded 0.118 , (g/100g protein) . Tryptophan increased to 0.089, 0.102 , 0.110 ((g/100g protein) compared with control which recorded 0.075. Also methionine content increased to 0.150 , 0.173 and 0.195 (g/100g protein) compared with control which recorded 0.055 (g/100g protein) . Also the addition of wheat gluten increased amino acid cysteine in pan bread to 0.566, 0.607 and 0.626 (g/100g protein) at level 2, 4 and 6% respectively compared with control which recorded 0.516 (g /100 protein) . Theses results were in agreement with those reported by ***Stevenson and Preston (1994).***

Table (29): Chemical composition of pan bread fortified with different levels of corn gluten

Chemical compostion	Control %	Corn gluten level 2%	4%	6%
Crude protein	11.89	13.09	14.29	15.49
Crude fat	0.8	0.88	0.96	1.04
Crude fiber	0.727	0.849	0.971	1.093
Ash content	0.73	0.834	0.938	1.042

Chemical composition of pan bread fortified with corn gluten

The data in Table (29) showed that addition of cron gluten of protein, crude fat, crude fiber and ash in pan bread addition of corn gluten at the levels 2,4 and 6% resulted increasing protein content to 13.09 , 14.29 and 15.49% respectively compared with control which recorded 11.89%. Theses finding were in line with those obtained by ***Hussein et al (1977) and Schur (1990).***

Table (30): Amino acid content of pan bread fortified with different levels of corn gluten (g/100 gm protein).

Amino Acids	Control	Corn gluten level		
		2%	4%	6%
Aspartic	0.392	0.442	0.4.92	0.541
Threonine *	0.316	0.364	0.408	0.436
Serine	0.449	0.486	0.523	0.561
Glutamic	4.216	4.432	4.649	4.866
Proline	0.879	0.962	1.045	1.128
Glycine	0.427	0.449	0.471	0.493
Alanine	0.384	0.458	0.532	0.607
Cysteine	0.516	0.554	0.565	0.577
Valine *	0.499	0.53	0.59	0.605
Methionine *	0.055	0.139	0.177	0.204
Iso-Leucine *	0.479	0.513	0.547	0.564
Leucine *	0.685	0.938	0.143	1.183
Tyrosine	0.195	0.235	0.275	0.314
Phenylalanine *	0.61	0.65	0.707	0.796
Histidine *	0.284	0.306	0.327	0.349
Lysine *	0.118	0.136	0.154	0.165
Arginine *	4.716	4.743	4.77	4.797
Tryptophan *	0.075	0.087	0.094	0.103

* E.A.A.

Amino acid content of pan bread fortified with corn gluten.

The data in Tabl(30) showed that the addition of cron gluten to wheat flour increased the amino acid content in pan bread at levels 2,4 and 6% . The essential as well as the non essential amino acids increased when compared with control . On adding corn gluten to wheat flour lysine content increaesed to 0.136 , 0. 154 and 0.165 (g/100gprotein) . compared with control which recorded 0.118 (g/100g protein) tryptophan also increased to 0.087, 0.094 and 0.1.3 g / 100g protein) at addition levels 2,4 and 6% compared with control which recorded 0.0 75. (g/100g protein) Methionine content also recorded an increase (0.139 , 0.177 and 0.204 (g/100g protein) the addition of wheat gluten also increused the amino acid cystine in pan bread to 0.554 , 0.565 and 0.577 (g/100g protein) compared with control which recorded 0.516 (g/100g protein). These results were in accordance with those reported by ***Abu Raya (1980).***

Table (31): Chemical composition of pan bread fortified with different levels of casein

Chemical compostion	Control %	Casein level 2%		4% 6%
Crude protein	11.89	13.59	15.29	16.99
Crude fat	0.8	0.81	0.82	0.83
Crude fiber	0.727	0.727	0.727	0.727
Ash content	0.73	0.8	0.87	0.94

Chemical composition of pan bread fortified with casein.

The data in Table (31) showed that addition of casein to wheat flour increased the content of protein , crude fat , crude fiber and ash in pan bread. Addition of casein at the levels 2,4 and 6% increased protein content to 13.59 , 15.29 and 16.99% respectively compared with control which recorded 11.89%. Thses results were in agreement with those reported by ***Oisansky et al (1971).***

Table (32): Amino acid content of pan bread fortified with different levels of casein (g/100 gm protein) .

Amino Acids	Control	Casein level		
		2%	4%	6%
Aspartic	0.392	0.504	0.616	0.72
Threonine *	0.316	0.44	0.512	0.584
Serine	0.449	0.542	0.635	0.727
Glutamic	4.216	0.627	5.039	5.45
Proline	0.879	1.106	1.333	0.56
Glycine	0.427	0.461	0.495	0.529
Alanine	0.384	0.443	0.502	0.561
Cysteine	0.516	0.58	0.622	0.649
Valine *	0.499	0.63	0.685	0.754
Methionine *	0.055	0.18	0.222	0.289
Iso-Leucine *	0.479	0.63	0.696	0.796
Leucine *	0.685	1.06	1.239	1.407
Tyrosine	0.195	0.296	0.328	0.424
Phenylalanine *	0.61	0.714	0.825	0.942
Histidine *	0.284	0.348	0.412	0.476
Lysine *	0.118	0.37	0.4	0.497
Arginine *	4.716	4.782	4.849	4.915
Tryptophan *	0.075	0.108	0.17	0.136

* E.A.A.

Amino acid content of pan bread fortified with casein.

The data in Table (32) showed that the addition of casein to wheat flour increased the amino acid content at the level 2,4 and 6% the essential as well as the non essential amino acids compared with control adding casein to wheat lysine content increased to 0.37 , 0.40 and 0.497 (g/100g protein) compared with control 0.118 (g/100 protein) tryptophan also increased to 0.108 , 0.117 and 0.136 at addition levels 2,4 and 6% compared with control that recorded 0.075. Methionine content also increased to 0.18 , 0.222 and 0.289 (g/100g protein) compared with control 0.055 (g/100g protein) the amino acid cystine also increase to 0.58, 0.622 and 0.649 (g /100 g protein) compared with control 0.516 (g/100g protein) as mentioned by ***Abu Raya (1982).***

Table (33): Chemical composition pan bread fortified with different levels of defatted soy flour

Chemical composition	Control %	Deffated soy flour level		
		5%	10%	15%
Crude protein	11.89	13.99	16.09	18.19
Crude fat	0.8	2.9	5	7.1
Crude fiber	0.727	1.052	1.377	1.702
Ash content	0.73	1.055	1.38	1.705

Chemical composition of pan bread fortified with defatted soy flour .

The data in Table (33) showed that defatted soy flour when added to wheat flour resulted increasing the content of protein, crude fat, crude fiber and ash in pan bread A. addition of defatted soy flour at levels 5,10 and 15% resulted increasing protein conttent to 13.99 , 16.09 and 18.10 % resctively compared with control (11.89%) these results were in agreement with those reported by ***Patt et al (1984).***

Table (34): Amnio acid content of pan bread fortified with different levels of defatted soy flour (g/100 gm protein)

with defatted soy flourAmino Acids	Control	Deffated soy flour level		
		5%	10%	15%
Aspartic	0.392	0.676	0.959	1.243
Threonine *	0.316	0.368	0.412	0.44
Serine	0.449	0.534	0.619	0.704
Glutamic	4.216	4.731	5.247	5.762
Proline	0.879	1.013	1.147	1.81
Glycine	0.427	0.53	0.633	0.736
Alanine	0.384	0.494	0.603	0.713
Cysteine	0.516	0.587	0.631	0.640
Valine *	0.499	0.54	0.555	0.6
Methionine *	0.055	0.085	0.09	0.1
Iso-Leucine *	0.479	0.595	0.12	0.68
Leucine *	0.685	0.728	0.756	0.77
Tyrosine	0.195	0.273	0.28	0.291
Phenylalanine *	0.61	0.63	0.642	0.699
Histidine *	0.284	0.368	0.452	0.536
Lysine *	0.118	0.221	0.3	0.36
Arginine *	4.716	4.888	5.059	5.231
Tryptophan *	0.075	0.91	0.101	0.109

* E.A.A.

Amino acid content of pan bread fortified with defatted soy flour.

The data in Table (34) showed that the addition of defatted soy flour to wheat flour increased the amino acid content in pan bread at the levels 5,10 and 15%. The essential and non essential amino acid increased when compared with control . Lysinne content increased to 0.221 , 0.300 and 0.36 (g/100g protein) compared with control recording 0.118 (g/100 g protein) respectively at levels 5, 10 and 15% compared with control content that recorded 0.075 (g/100g protein). Methionine content recorded increase to 0.085 , 0.09 and 0.1 (g/100 g protein) respectively of compared with control content recording 0.055 (g / 100g protein) . On the other hand , cysteine increased to 0.587, 0.631 and 0.640 (g/100g ptrotein) respectively at addition levels 5,10 and 15% respectively compared with control which recorded 0.516. Theses mentioned results were coincide with those reported by ***Hallab et al (1974) and Patt et al (1984).***

Table (35): Chemical composition of balady bread fortified with different levels of wheat gluten

Chemical composition	Control %	Wheat gluten level 2%	4%	6%
Crude protein	13.09	14.57	16.05	17.53
Crude fat	1.32	1.358	1.396	1.434
Crude fiber	1.159	1.165	1.171	1.177
Ash content	1.1	1.112	1.124	1.136

Chemical composition of balady bread fortified with wheat gluten.

The data in Table (35) showed addition of wheat gluten to wheat flour increased the content of protein, crude fat , crude fiber and ash at levels 2,4 and 6% resulted in in creasing protein content to 14.57, 16.05 and 17.53% respectively compared with control recording 13.09. These results were in accordance with those by ***Dubois and Cottel (1957) and Yaseen (1985).***

Table (36) :Amino acid content of balady bread fortified with different levels of wheat gluten (g/100gm protein)

Amino Acids	Control	Wheat gluten level		
		2%	4%	6%
Aspartic	0.502	0.553	0.604	0.656
Threonine *	0.4	0.496	0.556	0.604
Serine	0.569	0.636	0.702	0.769
Glutamic	5.346	5.831	6.316	6.801
Proline	1.099	1.32	1.542	1.763
Glycine	0.547	0.599	0.65	0.702
Alanine	0.484	0.527	0.569	0.612
Cysteine	0.615	0.688	0.759	0.782
Valine *	0.6	0.7	0.83	0.935
Methionine *	0.155	0.202	0.218	0.244
Iso-Leucine *	0.6	0.67	0.7	0.74
Leucine *	0.84	1.12	1.211	1.314
Tyrosine	0.339	0.384	0.459	0.54
Phenylalanine *	0.698	0.781	0.865	0.948
Histidine *	0.464	0.504	0.544	0.583
Lysine *	0.146	0.180	0.216	0.232
Arginine *	6.076	6.128	6.18	6.232
Tryptophan *	0.092	0.11	0.13	0.146

* EA.A.

Amino acid content of balady bread fortified with different levels of wheat gluten.

The data in Table (36) showed that the addition of wheat gluten to wheat flour increased the amino acid content in balady bread at the levels 2,4 and 6% . Both the essential and non-essential amino acids increased when compared with control. Adding wheat gluten to wheat flour, lysine content marked an increase of 0.180 , 0.216 and 0.232 (g/100g protein) respectively compared with control that recorded 0.146 (g / 100g protein). Tryptophan also increased to 0.11 , 0.13 and . 0.146 (g/100g protein) respectively compared with control 0.092 (g/100g protein). On the opther hand , methionine content also recorded an incearese of 0.202, 0.218 and 0.244 (g/100g protein) respectively Compared with control that recorded 0.155 . Cysteine also incresed to 0.688 , 0.759 and 0.782 (g/100g protein) respectively in comparison with control recording 0. 615 (g/ 100g protein). These results were in a cordance with those obtianed by ***Schur (1991) and Stauffer (1993).***

Table (37): Chemical composition of balady bread fortified with different levels of corn gluten

Chemical compOstion	Control %	Corn gluten level 2%	4%	6%
Crude protein	13.085	14.29	15.49	16.69
Crude fat	1.32	1.4	1.48	1.56
Crude fiber	1.159	1.281	1.403	1.525
Ash content	1.1	1.24	1.308	1.412

Chamical composition of balady bread supplemented with corn gluten.

The data in Table (37) showed that addition of corn gluten to wheat flour cased an increase the content of protein, crude fat, crude fiber and ash in balady bread. Adding 2,4 and 6% protein content increased recording 14.29, 15.49 and 16.69% respectively compared with control that recorded 13.085% these results were in agreement with those reported by ***Hussein et (1977) and Abo Rya (1980).***

Table (38) :Amino acid content of balady bread fortified with different levels of corn gluten (g/100gm protein).

Amino Acids	Control	Corn gluten level		
		2%	4%	6%
Aspartic	0.502	0.552	0.602	0.651
Threonine *	0.4	0.456	0.512	0.548
Serine	0.569	0.606	0.643	0.681
Glutamic	5.346	5.562	5.779	5.996
Proline	1.099	1.182	1.265	1.348
Glycine	0.547	0.569	0.591	0.613
Alanine	0.484	0.558	0.932	0.707
Cysteine	0.6156	0.668	0.707	0.729
Valine *	0.6	0.665	0.74	0.755
Methionine *	0.155	0.2	0.221	0.248
Iso-Leucine *	0.6	0.64	0.684	0.704
Leucine *	0.84	1.064	1.162	1.267
Tyrosine	0.339	0.352	0.42	0.531
Phenylalanine *	0.698	0.752	0.806	0.86
Histidine *	0.464	0.486	0.507	0.529
Lysine *	0.146	0.170	0.193	0.206
Arginine *	6.076	6.103	6.13	6.157
Tryptophan *	0.92	0.109	0.121	0.136

* E.A.A

Amino acid content in balady bread fortified with corn gluten

The data in Table (38) indicated that addition of corn gluten to wheat flour lead to an increase in amino acid content in balady bread at the levels 2,4 and 6%. It is noted that both essential and non essential amino acid increased compared with control. Adding corn gluten increased lysine content to 0.170, 0.193 and 0.206 (g/100g protein) respectively compared with control 0.146 (g/100g protein) . Tryptohan also increased to 0.10 , 0.121 and 0.136 (g/100g protein) respectively compared with control 0.092 (g/100g protein). Methionine content also increased to 0.200, 0.221 and 0.248 (g/100g protein) respctively compared with control which recorded 0.155 (g/100g protein) . On the other hand , the amino acid cysteine increased to 0.668 , 0.707 and 0.729 (g/100g protein) respectively compared with control recording 0.615 (g/100g protein) as mentioned by ***Schur (1991).***

Table (39): Chemical compostion of balady bread fortified with different levels of caesin

Chemical compostion	Control	Casein level		
	%	2%	4%	6%
Crude protein	13.085	14.79	16.49	18.19
Crude fat	1.32	1.33	1.34	1.35
Crude fiber	1.159	1.159	1.159	1.159
Ash content	1.1	1.17	1.24	1.31

Chemical composition of balady bread supplemented with casein

The data in Table (39) showed that adding casein to wheat flour increased the content of protein, crude fat , crude fiber and ash in balady bread. Addition of casein at the levels 2,4 and 6% resulted in increasing protein content to 14.79 , 16.49 and 18.19 % respectively compared with control that recorded 13.083%. These result were in agreement with those reported by ***kinsella (1971) and Greaves (1980).***

Table (40): amino acid content of baladty bread fotified with different levels of casein (g/100 gm protein) .

Amino Acids	Control	Casein level		
	%	2%	4%	6%
Aspartic	0.502	0.614	0.726	0.838
Threonine *	0.4	0.56	0.632	0.708
Serine	0.569	0.662	0.755	0.847
Glutamic	5.346	5.757	6.169	6.58
Proline	1.099	1.326	1.553	1.78
Glycine	0.547	0.581	0.615	0.649
Alanine	0.484	0.543	0.602	0.661
Cysteine	0.615	0.665	0.733	0.795
Valine *	0.6	0.78	0.855	0.935
Methionine *	0.155	0.285	0.321	0.378
Iso-Leucine *	0.6	0.8	0.86	0.952
Leucine *	0.84	1.33	1.547	1.757
Tyrosine	0.339	0.445	0.538	0.65
Phenylalanine *	0.698	0.815	0.902	1.058
Histidine *	0.464	0.528	0.592	0.656
Lysine *	0.146	0.400	0.529	0.972
Arginine *	6.076	6.142	6.209	6.275
Tryptophan *	0.092	0.130	0.142	0.166

* E.A.A.

Amino acid content of balady bread fortified with casein.

The data in Table (400 manifested that hte addition of casein to wheat flour leAd to increasing the amino acid content in balady bread at the levels 2,4 and 6% respectively. The essential as well as nono - essential amino acids increased when compared with with control. Adding casein to wheat flour lysine content increased to (0.400 , 0.529 and 0.972 g / 100 g protein) espectively compaved with control that recorded 0.146 (g/100g protein) . Also , Tryptophan increased to 0.130 , 0.142 and 0.166 (g /100 g protein)rescored 0.092 (g/100g protein) Methionine on the other hand increased to 0.285 , 0.321 and 0.378 (g/100g protein) respectively when compared with control 0.155 (g/100g protein) cysteine also increased to 0.665 , 0.733 and 0.795 (g/100g protein) respectively compared with control which recorded 0.165 (g/100g protein). These results were in accordance with those obtained by ***Milatovic et al (1978) and Bungapamai et al (1982).***

Table (41) : Chemical composition of balady bread fortified with different levels of defatted soy flour

Chemical composition	Control	Defatted soy flour level		
	%	2%	4%	6%
Crude protein	13.085	15.19	17.29	19.39
Crude fat	1.32	1.495	1.67	1.845
Crude fiber	1.159	1.484	1.809	2.134
Ash content	1.1	1.298	1.495	1.693

Chemical compoistion of balady bread fortified with deffated soy flour

The data in Table (41) manifested that the addition of defatted soy flour to wheat flour resulted increeasing the content of protein, crude fat , crude fiber , and ash in balady bread . Adding defated soy flour at levels , 5, 10 and 15% led to an increase in protein content 15.19 , 17.29 and 19.39% respectively compared with control that recorded 13.085%. These result were coinicide with those reported by ***Titcomb and Juers (1976) and Padagett (1996).***

Table (42) :Amino acid conten of balady bread fortified with different levels of defatted soy flour (g/100gm protein)

Amino Acids	Control	Defatted soy flour level		
		2%	4%	6%
Aspartic	0.502	0.786	1.069	1.353
Threonine *	0.4	0.476	0.576	0.64
Serine	0.569	0.654	0.739	0.824
Glutamic	5.346	5.861	6.377	6.892
Proline	1.099	1.233	1.367	1.501
Glycine	0.547	0.65	0.753	0.856
Alanine	0.484	0.594	0.703	0.813
Cysteine	0.615	0.658	0.701	0.712
Valine *	0.6	0.675	0.76	0.84
Methionine *	0.155	0.182	0.202	0.208
Iso-Leucine *	0.6	0.744	0.764	0.85
Leucine *	0.84	1.169	1.267	1.42
Tyrosine	0.339	0.397	0.454	0.512
Phenylalanine *	0.698	0.753	0.79	0.898
Histidine *	0.464	0.548	0.632	0.716
Lysine *	0.146	0.28	0.381	0.45
Arginine *	6.076	6.248	6.419	6.591
Tryptophan *	0.092	0.114	0.138	0.160

* E.A.A.

Amino acid content of balady bread fortified with defatted soy flour.

The data in Table (42) showed that the addition of defatted soy flour to wheat flour lead to an increase in amino acid content at addition levels 5, 10 and 15%. Both essential and non essential amino acids increased when compared with control. Lysine content increased to 0.280 , 0.381 and 0.450 (g/100g protein) respectively compared with control that recorded 0.146 (g / 100g protein) Also , tryptophan increased to 0.114 , 0.138 and 0.160 (g / 100g protein) respectively in comparison with control which recorded 0.092 (g/100g protein) . On the other hand , methionine marked an increase of 0.182 , 0.202 and 0.208 (g/100g protein) respectively in comparison with control recording 0.155 (g/100g protein) Cysteine also increased to 0.658 , 0.701 and 0.712 (g/100g protein) respectively compared with control that recorded 0.615 (g / 100 protein). These results were in accordance with those obtained by ***Chernikova et al (1972) and Padgette (1992).***

Table (43) : Chemical composition of balady bread (wheat flour + corn flour) fortified with different levels of wheat gluten

Chemical compostion	Control	Wheat gluten level		
	%	2%	4%	6%
Crude protein	12.2	13.68	15.16	16.64
Crude fat	1.754	1.792	1.83	1.868
Crude fiber	1.877	1..880.	1.889	1.895
Ash content	1.142	1.154	1.166	1.178

Chemical composition of balady bread (wheat flour mixed with cron flour fortified with wheat gluten).

The data in Table (43) Showed that the addition of wheat gluten to wheat flour mixed with corn flour resuled an increasing the content of protein, crude fat, crude fiber and ash. Adding wheat gluten at the levels 2,4 and 6% increased protein content to 13.68 , 15.16 and 16.64% respectively compared with control that recorded 12.2% . These results were in agreement with those reported by ***Titcomb and Juers (1976) and Hussein (1977).***

Table (44): Amino acid content of balady bread (wheat flour + corn flour) fortified with different levels of wheat gluten (g/100 gm protein)

Amino Acids	Control	Wheat gluten level		
		2%	4%	6%
Aspartic	0.959	1.011	1.062	1.113
Threonine *	0.324	0.4	0.448	0.484
Serine	1.132	1.199	1.266	1.332
Glutamic	10.66	11.145	11.63	12.11
Proline	2.968	3.19	3.4	3.6
Glycine	0.501	0.553	0.604	0.656
Alanine	0.825	0.867	0.94	0.95
Cysteine	0.245	0.255	0.268	0.280
Valine *	0.485	0.57	0.67	0.75
Methionine *	0.385	0.465	0.516	0.543
Iso-Leucine *	0.48	0.54	0.564	0.596
Leucine *	0.686	0.91	0.98	1.092
Tyrosine	0.45	0.474	0.497	0.526
Phenylalanine *	0.404	0.486	0.595	0.694
Histidine *	0.408	0.448	0.487	0.527
Lysine *	0.119	0.140	0.175	0.188
Arginine *	4.962	5.014	6.966	5.118
Tryptophan *	0.074	0.09	0.105	0.117

* E.A.A.

Amino acid content of balady bread (wheat flour mixed with corn flour) supplemented with wheat gluten.

The data in Table (44) manifested that the addition of wheat gluten lead to an increase in amino acid content at the addition levels 2,4 and 6%. Both the essential and the non essential amino acids increased when compared with control. Adding wheat gluten increased lysine content to 0.140 , 0.175 and 0.188 (g/100g protein) respectively compared with control recording 0.119 ((g/100g protein) Also tryptophan increased to 0.090 , 0.105 and 0.117 (g/100g protein) respectively compared with control that recorded 0.074 (g/100g protein) . On the other hand , methionine marked an increase of 0.465 , 0.516 and 0.543 (g/100g protein) respectively compared with control recording 0.385 (g/100g protein) . Cysteine also increased to 0.255 , 0.268 and 0.280 (g/100g protein) respectively in comparison with control that recorded 0.245 (g/100g protein) as mentioned by ***Schur (1991)*** .

Table (45): Chemcal compastein of balady bread (wheat flour + corn flour) fortified with different levels of corn gluten

Chemical compostion	Control	Corn gluten level		
	%	2%	4%	6%
Crude protein	12.2	13.4	14.6	15.8
Crude fat	1.754	1.834	1.914	1.994
Crude fiber	1.877	1.999	2.121	2.243
Ash content	1.142	1.246	1.35	1.454

Chemical composition of balady bread (wheat flour mixed with corn flour) fortified with corn gluten.

The data in Table (45) showed that addition of corn gluten to wheat flour mixed with corn flour fat increased fiber and ash in balady bread . Adding 2, 4 and 6% corn gluten increased protein content that recorded 13.4 , 14.6 and 15.8% respectively compared with control recording 12.2% . These results were in agreement with those reported ***by Hussein et al (1977) and El-Saied and El-Farra (1981).***

Table (46): Amino acid content of balady bread (wheat flour + corn flour) fortified with different levels of corn gluten (g/100 gm protein) .

Amino Acids	Control	Corn gluten level		
		2%	4%	6%
Aspartic	0.959	1.009	1.059	1.109
Threonine *	0.324	0.368	0.401	0.44
Serine	1.132	1.17	1.207	1.244
Glutamic	10.66	10.88	11.1	11.31
Proline	2.968	3.051	3.134	3.218
Glycine	0.501	0.523	0.545	0.567
Alanine	0.825	0.899	0.973	0.047
Cysteine	0.245	0.256	0.267	0.279
Valine *	0.485	0.535	0.595	0.61
Methionine *	0.385	0.441	0.479	0.505
Iso-Leucine *	0.48	0.516	0.552	0.568
Leucine *	0.686	0.868	0.945	1.029
Tyrosine	0.45	0.49	0.53	0.569
Phenylalanine *	0.404	0.425	0.483	0.578
Histidine *	0.408	0.429	0.451	0.473
Lysine *	0.119	0.084	0.157	0.167
Arginine *	4.962	4.989	5.016	5.043
Tryptophan *	0.074	0.088	0.097	0.109

* E.A.A.

Amino acid content in balady bread (wheat flour mixed with corn flour) fortified with corn gluten.

The data in Table (46) mainfested that addition of corn gluten to wheat flour mixed with corn flour increased the amino acid content at the levels 2,4 and 6%. It also showed that an increase in both essential and non essential amino acids compared with control , took place. Adding corn gluten increased lysine content to 0.084 , 0.157 and 0.167 (g/100g protein) compared with control which recorded to 0.119 (g /100g protein). Tryptophan also increased to 0.088, 0.079 and 0.109 (g/100 g protein) compared with control that recorded 0.074 (g/100g protein). Similarly an increase in methionine content took place . It recorded 0.441 , 0.479 and 0.505 (g/100g protein) respectively compared with control recording 0.385 (g/100g protein). Also cysteine increased to 0.256 , 0.267 and 0.279 (g/100g protein) respectively compared with control which recorded 0.245 (g/100 g protein). These results were coinside with those reported by ***Abu Raya (1980)***.

Table (47) :Chemical composition of balady bread (wheat flour + con flour) fortified with different levels of casein

Chemical compostion	Control	Casein level		
	%	2%	4%	6%
Crude protein	12.2	13.9	15.6	17.3
Crude fat	1.754	1.764	1.774	1.784
Crude fiber	1.877	1.877	1.877	1.877
Ash content	1.142	1.212	1.282	1.352

Chemical composition of balady bread (wheat flour mixed corn flour) fortified with casein.

Data in Table (47) indicated that the addition of casein to wheat flour mixed with corn flour increased the content of protein, crude fat, crude fiber and ash. Adding 2,4 and 65 of casein resulted incerasing protein content to 13.9, 15.6 and 17.3% respectively compared with control that recorded 12.2%. These results were in accordance with those obtained by ***Titcomb and Juers(1977)***.

Table (48) :Amino acid content of balady bread (wheat flour + corn flour) fortified with different levels of casein (g/100 gm protein) .

Amino Acids	Control	Casein level		
		2%	4%	6%
Aspartic	0.959	1.071	1.183	1.295
Threonine *	0.324	0.45	0.508	0.568
Serine	1.1323	1.225	1.318	1.411
Glutamic	10.66	11.07	11.49	11.9
Proline	2.968	3.195	3.422	3.65
Glycine	0.501	0.535	0.569	0.603
Alanine	0.825	0.884	0.943	1.002
Cysteine	0.245	0.252	0.259	0.267
Valine *	0.485	0.63	0.69	0.75
Methionine *	0.385	0.508	0.585	0.675
Iso-Leucine *	0.48	0.64	0.692	0.764
Leucine *	0.686	1.08	1.253	1.421
Tyrosine	0.45	0.488	0.524	0.569
Phenylalanine *	0.404	0.552	0.659	0.828
Histidine *	0.408	0.472	0.536	0.6
Lysine *	0.119	0.32	0.426	0.46
Arginine *	4.962	5.029	5.095	5.161
Tryptophan *	0.074	0.1	0.114	0.133

* E.A.A.

Amino acid content of balady bread (wheat flour mixed with corn flour) fortified with casein.

Data in Table (48) Showed that the addition of casein to wheat flour mixed with corn flour led to an increase in amino acid content . Adding 2,4 and 6% resulted in increasing both essential and essential amino acids compared with control . Lysine increased to 0.320, 0.426 and 0.460 (g/100g protein) respectively compared with control whicn recorded 0.119 (g/100g protein) Likewise, tryptophan increased to 0.100, 0.114 and 0.133 respectively compared with control that recorded 0.074 (g/100g protein). Similarly , methionine content recorded an increase of 0.508 , 0.585 and 0/675 (g/100g protein) respectively compared with control recording 0.385 g /100 g protein. The amino acid cysteine also increased to 0.252, 0.259 and 0.267 (g/100g protein) compared with control that recorded 0.245 (g/100g protein). These mentianed results were coinicide with those reported by ***Bungapamia et al (1982).***

Table (49) : Chemical composition of balady bread (wheat flour + corn flour) fortified with different levels of defatted soy flour

Chemical compostion	Control	Deffated soy flour level		
		2%	4%	6%
Crude protein	12.2	14.3	16.4	18.5
Crude fat	1.754	1.929	2.104	2.279
Crude fiber	1.877	2.052	2.227	2.402
Ash content	1.142	1.34	1.537	1.735

Chemical composition of balady bread (wheat flour mixed with corn flour) fortified with defatted soy flour.

The data in Table (49) showed that addition of defatted soy flour to wheat flour mixed with corn flour led to an increase in the content of protein, crude fat , crude fiber and ash. Adding 5, 10 and 15% of defated soy flour increased protein content to 14.3 , 16.4 and 18.5% respectiyley in comparsion with control that recorded 12.2%. These results were in accordance with those obtained by ***Padgette et al (1996).***

Table (50): Amino acid content of balady bread (wheat flour + corn flour) fortified with different levels of defatted soy flour (g/100 gm protein) .

Amino Acids	Control	Deffated soy flour level		
		2%	4%	6%
Aspartic	0.958	1.243	1.526	1.81
Threonine *	0.324	0.384	0.464	0.52
Serine	1.132	1.217	1.302	1.387
Glutamic	10.66	11.18	11.69	12.21
Proline	2.968	3.102	3.236	2.37
Glycine	0.501	0.604	0.707	0.81
Alanine	0.825	0.934	1.044	1.153
Cysteine	0.245	0.268	0.285	0.29
Valine *	0.485	0.545	0.61	0.68
Methionine *	0.385	0.408	0.429	0.45
Iso-Leucine *	0.48	0.576	0.616	0.68
Leucine *	0.686	0.952	1.029	1.14
Tyrosine	0.45	0.466	0.478	0.489
Phenylalanine *	0.404	0.486	0.547	0.671
Histidine *	0.408	0.492	0.576	0.66
Lysine *	0.119	0.227	5.307	0.36
Arginine *	4.962	5.134	5.305	5.477
Tryptophan *	0.074	0.092	0.111	0.13

* E.A.A.

Amino acid content in balady bread (wheat flour mixed with corn flour) fortified with defatted soy flour.

The data inTable (50) manifested that the addition of defatted soy flour to wheat flour mixed corn flour increased the amino acid content at the levels 5 , 10 15%. It increased the essential and non - essential amino acids compared with control. Lysine content marked an increase of 0.227 , o.307 , 0.360 (g/100 g protein) respectively compared with control recording 0.11g (g/100 protein) . Similary tryptophan increased to 0.092 , 0.111 and 0.130 (g/100 g protein) respectively compared with control that recorded 0.074 (g/100 g protein). Also the amino acid methionine increased to 0.408 , 0.429 and 450 (g/100 g protein) respectively compared with control that recorded 0.385 g/100 g protein. The amino acid cystein also increaseed to 0.268, 0.285 and 0.290 (g/100 g protein) resepectively compared with control 0.245 9 g/100 protein). These results were in accordance with those obtained by ***Chernikova et al (1972)*** .

Table (51): Chemical score of pan bread

Wheat flour 72% extraction														
Amino acids	**FAO**	**control**	**corn gluten**			**wheat gluten**			**soy flour**			**Casein**		
			2%	4%	6%	2%	4%	6%	5%	10%	15%	2%	4%	6%
Isol-Leucine	4	12	12.8	13.7	14.1	13.4	14	14.8	14.9	15.3	17	15.8	17.4	19.9
Leucine	7	9.79	13.4	14.9	16.9	12.7	14.4	16.06	10.2	10.8	11	15.2	17.7	20.1
Lysine *	5.4	2.19	2.51	2.86	3.05	2.61	3.2	3.44	4.09	5.56	6.59	6.8	7.4	9.2
Meth+Cyct	3.5	16.3	19.8	21.2	22.6	20.4	22.29	23.46	19.2	20.6	21.1	21.6	24.1	26.8
Phen +Trosine	6.1	13.2	14.5	16.1	18.2	15.3	17.38	19.48	14.8	15.1	16.2	16.5	18.9	22.4
Threonine	4	7.9	9.1	10.2	10.9	9.9	10.5	11.2	9.2	10.3	11	11.1	12.8	14.6
Tryprophan	1	7.5	8.7	9.4	10.3	8.9	10.2	11	9.1	10.1	10.9	10.8	11.7	13.6
Valine	5	9.98	10.6	11.8	12.1	11.2	12.48	13.74	10.8	11.1	11.9	12.5	13.7	14.9

* Limiting Amino Acid

Chemical score of pan bread :

The chemical score and essential amino acids of pan bread as compared with FAO/ WHO reference are given inTable (51). However, the methionine values have been combined with cystine and tyrosine with phenyl alanine. The results showed that lysine was the fist limiting amino acid in pan bread (control) and pan bread (supplemented with 2,4 and 6% of wheat gluten , corn gluten and casine 5,10 and 15% of deaftted soy flour.

Table (52) :Chemical scre of balady bread

Wheat flour 82% extraction													
Amino acids	**FAO**	**control**	**corn gluten**			**wheat gluten**			**soy flour**			**Casein**	
			2%	4%	6%	2%	4%	6%	5%	10%	15%	2%	4%	6%
Isol-Leucine	4	15	16	17.1	17.6	16.8	17.5	18.5	18.6	19.1	21.3	19.9	21.5	23.8
Leucine	7	12	15.2	16.6	18.1	16	17.3	19.2	16.7	18.1	20.3	19	22.1	25.1
Lysine *	5.4	2.7	3.14	3.58	3.82	3.27	4	4.3	5.19	7.06	8.37	7.4	9.8	10.6
Meth+Cyct	3.5	22	24.8	26.5	27.9	25.5	27.9	29.3	24	25.8	26.4	27	30.1	33.5
Phen +Trosine	6.1	17	18.1	20.1	22.8	19.1	21.7	24.4	18.8	20.4	23.1	20.6	23.6	28
Threonine	4	10	11.4	12.8	13.7	12.4	13.9	15.1	11.9	14.4	16	13.9	15.8	17.7
Tryprophan	1	9.2	10.9	12.1	13.6	11.1	13	17.6	11.4	13.8	15.9	12.8	14.2	16.6
Valine	5	12	13.3	14.8	15.1	14	16.6	18.7	13.5	15.2	16.8	15.6	17.1	18.7

* Limiting Amino Acid

Chemical score of Balady bread :

The Chemical score of balady bread the chemical score and essential amino acids of balady bread as compared with FAO/WHO reference are giuen in Table (52) anyway the methionine values have abeen combiend with cystine and tyrosine with phenyl alanine. The results man fested that lysine was the first limiting amino acid in balady bread (control) and balady bread , supplemented with 2,4 and 6% of wheat gluten on one hand , and 5, 10 and 15% of defated soy flour on the other.

Table (53): Chemical score of baldy bread (wheat flour 82% + corn flour)

Wheat flour 82% extraction + corn flour														
Amino acids	**FAO**	**control**	**corn gluten**			**wheat gluten**			**soy flour**			**Casein**		
			2%	4%	6%	2%	4%	6%	5%	10%	15%	2%	4%	6%
Isol-Leucine	4	12	12.9	13.8	14.2	13.5	14.1	14.9	14.4	15.4	17.1	16	17.3	19.1
Leucine	7	9.8	12.4	13.5	14.7	13	14	15.6	13.6	14.7	16.3	15.4	17.9	20.3
Lysine *	5.4	2.2	1.56	2.91	3.1	2.66	3.24	3.48	4.2	5.69	6.74	5.96	7.88	8.52
Meth+Cyct	3.5	18	19.9	21.3	22.4	20.5	22.4	23.5	19.3	20.7	21.2	21.7	24.1	26.9
Phen +Trosine	6.1	14	15	16.6	18.8	15.8	17.8	20	15.6	16.8	19	17	19.4	22.9
Threonine	4	8.1	9.19	0.3	11	9.99	11.2	12.1	9.59	11.6	12.9	11.2	72.7	14.2
Tryprophan	1	7.4	8.73	9.74	10.9	8.94	10.5	11.7	9.18	11.1	12.8	10.3	11.4	13.3
Valine	5	9.7	10.7	11.9	12.2	11.3	13.4	15	10.9	12.2	13.5	12.6	13.8	15

* Limiting Amino Acid

Chemical score of balady bread (wheat flour mixed with corn flour)

The chemical score and the essential amino sids of balady bread

(wheat flour mixed with corn flour) as compared with FAO / WHO reference are given in Table (53) anghow , the methionine values have been combined with cystien and tyrosine with phenyl alanine. The results manifested that lysine was the first limiting amino acid in balady bread (wheat flour mixed with corn flour) (control) and the similar type supplemented with 2,4 and 6% of wheat gluten, corn gluten and casein on one hand , and 5 , 10 and 15% of defatted say flour on the other.

Table (54) :Biological evalution of bread from wheat flour 82% fortified with different protein rich sources

Biological pakameters / Fortification type	Level of fortification %	Digestibility coefficient D.C	Biological value (B.V)	Net protein utlization (N.P.U)
control Balady Bread (Wheat flour 82%)		84.18 ± 1.2	69.04 ±0.1	58.12±0.9
Balady Bread (Wheat flour 82%)	2	84.19 ± 1.3	70.6 ± 0.2	59.45 ± 4.1
	4	84.15±1.5	70.5 ± 3.5	59.34 ± 3.6
	6	83.5 ±1.7	69.7 ± 0.7	58.22 ± 3.8
Balady Bread (wheat flour 82%) + cron gluten	2	82.53±1.3	70.0 ± 0.3	57.71 ± 3.1
	4	83.38 ± 1.2	70.4 ± 0.7	58.74 ± 3.8
	6	82.75 ± 1.5	69.4+0.2	57.5 ± 3.2
Balady Bread (wheat flour 82%) + casein	2	84.13 ± 3.2	93.5 ± 3.5	78.72 ± 3.1
	4	83.73 ± 3.1	89.2 ± 4.9	74.71 ± 3.6
	6	82.4 ± 3.5	86.8 ± 5.5	71.6 ± 3.2
Balady Bread (wheat flour 82%) + soy flour	5	81.5 ± 1.2	86.9 ± 3.4	70.48 ± 3.2
	10	82.72 ± 1.3	8836 ± 4.1	73.32 ± 3.5
	15	80.3 ± 2.1	86.5 ± 3.9	69.5 ± 3.5

Biological evalution of bread from wheat flour 82% fortified with different protein rich sources

Table (54) Showed the biological evealution of balady bread fortified with wheat gluten, corn gluten, casein at level 2,4 and 6% and defatted soy flour at 5, 10 and 15% level . It was abserved that protein digestablity in general tended to decrease with increased level of fortification the lowest D.C was reported for bread wheat fortified with soy flour at 15% level while the highest was recorded for balady bread fortified with wheat gluten at 2% level on the other hand the biological value of balady bread fortified by different protein sources at different levels was varied ,where the lowest (69.04±0.1) recorded for balady bread (control) and the highest was found to be (93.5 ± 3.5), (89.2 ± 4.9) for balady bread fortifed with casein at 2 and 4% respectivly level followed by bread fortified with defatted soy flour at 15% while the other treatment were approximtly the same net protein utilization among rats fed on balady bread fortified with different protein sources was found to be highest among rats fed an balady bread fortified with 2 and 4% casein followed by 10% defatted soy flour. While the lowest was recorded for balady bread fortified with corn gluten at 6%. The other data was less corn more comparable. These variation are mostly due to the differences in food consumption and hence in the amount of protein consumed as a persntage in Table (54).

These results were in agreement with these reported by ***Lenfer Marques et al (1976).***

Table (55): Food intake , body weight , feed efficiency ratio and protein efficiency ratio of male albino rat fed different source of protein at level 10%

Source of protein	level of fortification %	food intake (gm)	body wiegh gain (gm)	food efficiency ratio	protein efficiency ratio
Balady Bread (wheat flour 82%) (control)		205 ± 5.4	22.6 ± 3.8	0.11	1.1
BaladyBread (wheat flour 82%) + wheat gluten	2	204.6 ± 9.1	26.8 ± 1.8	0.130	1.31
	4	204 ± 7.2	26.3 ± 3.2	0.129	1.29
	6	202.5 ± 5.3	26 ± 2.5	0.128	1.28
Balady Bread (wheat flour82%) + corn gluten	2	204 ±7.09	24.1 ± 1.7	0.118	1.18
	4	204.1 ±7.7	25.2 ± 2.9	0.123	1.23
	6	201 + 7	22.1 ± 1.9	0.159	1.59
Balady Bread (wheat flour 82%) + casein	2	205.6± 7.5	34 ± 2.1	0.165	1.65
	4	204.8± 6.7	33 ± 3.2	0.161	1.61
	6	204.1±9.6	32 ± 3.4	0.156	1.56
Balady Bread (wheat flour 82%) + soy flour	5	199.5±7.5	27.8 ± 2.3	0.139	1.39
	10	202.6±8.3	31.3 ±1.4	0.154	1.54
	15	198.8±8.3	26 ± 2.1	0.131	1.31

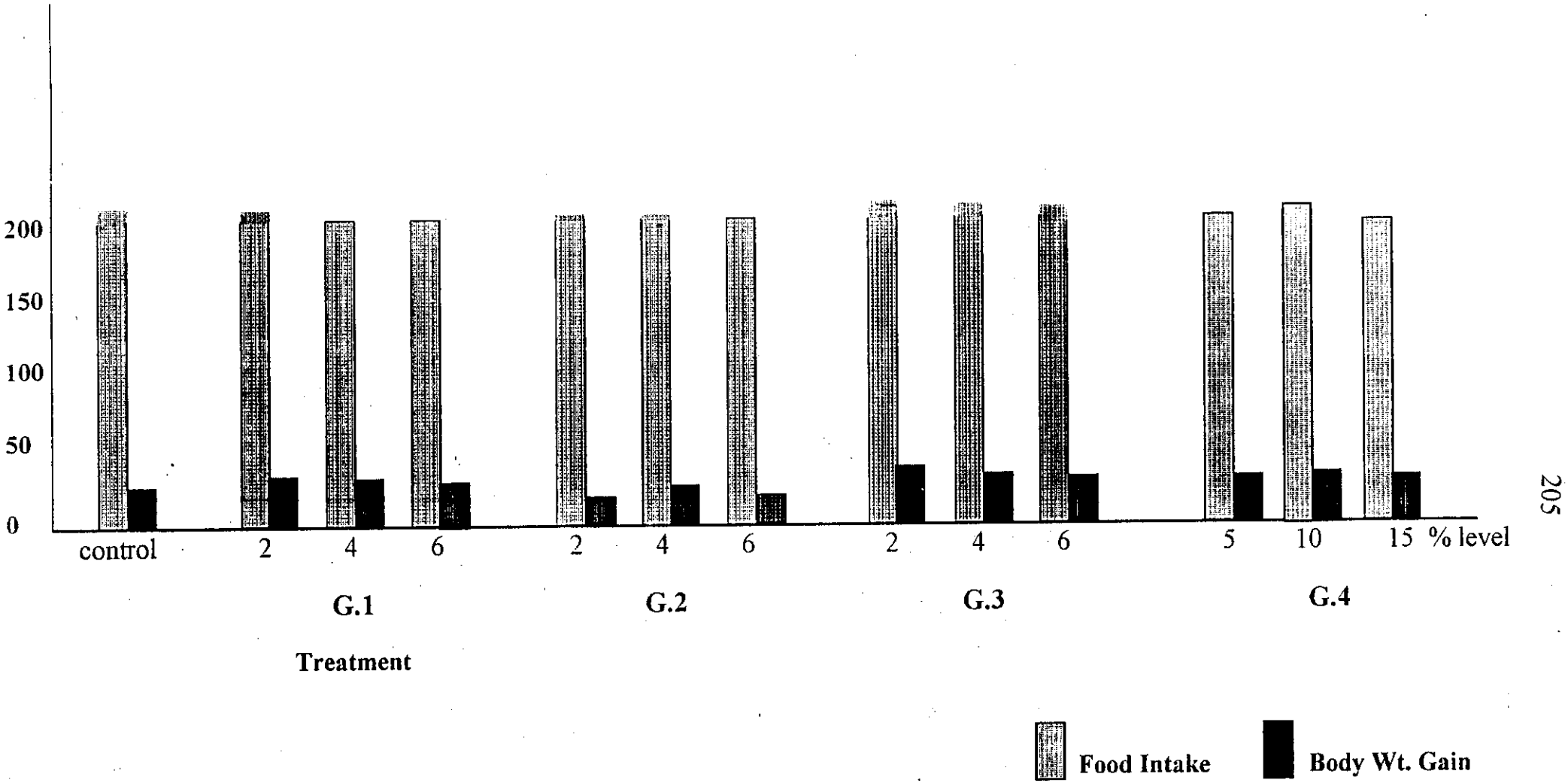

Fig (29): Food Intake and Body Weight Gain of Male Albino Rats fed Different Sources of Protein At 10% Level

Again Table (55) and figure (29) showed the mean body wagith gain among rats feed on different protein sources . It was found that highest waight gain (34±2.1) and (33±3.2g) were recorded for rat feed on bread fortified with casein at 2 and 4% respectivly which the loweat was observed for rat feed on bread fortified with corn gluten at 6% followed by control . These fending were reflected to food intake.

These results were in accordance with those obtain by ***Darwish et al (1990)*** .