

EFFECT OF USING ADMIXTURE OF RECOMBINANT CHYMO SIN (MAXIREN) WITH CHICKEN PEPSIN ON THE QUALITY OF WHITE PICKLED SOFT CHEESE .

El-Hawary , M. * ; I.Bakri ** and A. Al-Gandour ***

*** Food Science and Technology dept., fac. of Agric., Tanta University**

**** M.S.C in dairying – Fayoum Governorate.**

***** Animal Production Research Institute – Dairy Dept., Dokki , Cairo**

ABSTRACT

Admixtures of pure chymosin (C) (Maxirin) and pure chicken pepsin (P) at ratio(50:50 , 70:30 , and 90:10 % C:P) were tested for rheological properties (MCT) , curd tension and syneresis using zero , 6 and 12 % salty mixed milk . Results showed that Salty milk had higher (MCT) and syneresis while lower curd tension was resulted . On the other hand maxirin rennet gave the best curd tension , the quicker coagulation time (MCT) and less syneresis. Contrary to chymosin,chicken pepsin gave higher (MCT) , less curd tension values and higher syneresis . As the percentage of chymosin increased in the admixture of rennet , the MCT and curd tension increased while syneresis decreased . Same rennet admixtures were used for Domiati cheese processing from mixed buffaloe and cow milk (1:1) with 12 % salt . Yield of fresh cheese ranged between (24.60 and 25.70 %) , decreased after 120 days to be 19.60 and 21.80 % . Pepsin cheese had the highest yield while chymosin gave the lowest yield , pepsin cheese had higher moisture content , SN , NPN and TVFA . Admixing C:P (90:10) Gave the best quality cheese after 120 days . After 60 days pepsin Domiati cheese gave satisfactory accepted cheese .

INTRODUCTION

It is well known that pure chymosin had strong rennetability characteristic and less proteolytic activity, while pepsin enzyme had less rennetability effect and higher proteolytic activity sometimes causing loosing texture and bitterness defect in various cheeses. Recombinant chymosin is commercially found in the local markets, it found in market as Maxiren (pure chymosin).as well chicken pepsin is used by some countries as rennet for the production of some cheese varieties.

In practice, pepsin is not used by itself to make cheese because it suffers from a number of disadvantages. These are; i) a longer period of time is required for clot formation; ii) the curd formed is not as firm as calf rennin's, iii) there is some loss of fat in the whey; iv) organoleptic quality of the cheese is inferior to that of calf rennin's and v) activity of pepsin markedly eases above pH 6.5, restricting its use in the production of sweet cheese. g. (Swiss and Italian varieties). As a consequence, pepsin is used in combination with other rennets. The ratio with calf rennin is commonly 1:1 in effect; pepsin functions as an extender for calf rennet. Relatively satisfactory cheese, including long - hold varieties, can be made with the pepsin mixtures, but they are not the equivalent of cheese made with calf rennet. The commercial success of the pepsin - rennet blends is essentially due to the low cost of pepsin which is advantageously reflected in the product price. Rennet,

extracted from the proventriculus of chickens, has been reported to be acceptable for the production of such long - hold cheeses as Cheddar .

On the other hands recombinant chymosin is commercially found in the local market as Maxiren (pure chymosin).the aim of this investigation is admixing Maxiren rennet (chymosin c) with chicken pepsin P at a ratio (c:p 50:50) , (70 :30) and (90:10) for the production of domiati– like cheese , following the quality of cheese under different ratio of blended rennet , to select the best ratio for domiaticheese making .

MATERIALS AND METHODS

Buffalo and cow milks were obtained from Mahelet-Mousa,and Sakha experimental stations .

- Fresh young calf stomachs were obtained from local Slaughtering House of Tanta city . The stomachs were used immediately or stored at (-18 °C) until required .
- Chicken gizzards were obtained from Noubaria Slaughtering House , they stored at refrigerator conditions till extraction .
- Recombinant chymosin (Maxiren) is a high quality powder coagulant contains 100 % pure chymosin produced from the specific dairy yeast *Kluyveromyces lactis* . It is French made product of Gist-Brocads BV dairy Ingredients group .
- Clean good grade salt was bough from El-Nasr Co. , the salt was produced according to the items of the Egyptian Standard No . 723-1968 .

- Rennet used:

Calf rennet and pepsine chicken individually adjusted as the same strength before blending .

Domiate soft cheese making :

Cheese milk was heated to 63 oC for 20 minutes , then cooled to 42 oC followed by the addition of 0.02 % CaCl₂

Three percent clean salt was added to cheese milk then filtration through tight cloth was followed .

Rennets were added at 42 oC in sufficient amount to have firm coagulum in two hours .

The curd was transferred into the wooden mouldes for 2 hours , then certain weights were used for filtration . After 20 hours the cheese was pickled in whey adjusted to 12 % salt for room temperature ripening .

Treatments :-

- Control cheeses from Maxiren and other from pepsin was processed .
- Mixed rennet , (C:P) , (50:50) , (70:70) and (90:10) . the 3 blends were separately used for domiate cheese processing .

Milk coagulation time (MCT)

The stability of milk proteins to rennet was determined by measuring the time required for clotting to appear in a 10-ml milk sample to which a small volum (0.1 ml) of dilute rennet solution (0.005 N) had been added . The temperature of the sample was maintained at 30 °C during the test the coagulation time taken as a measure of the rennet stability was observed by

the the visual method by *Berridge , (1952) , and Davies and Whate , (1958) .*
The renneting time of each milk sample in seconds was determined.

- Curd tension

The curd tension is determined by using the method of *Chandrasekhara et al , (1957) .* as discribd by *Abd El-Salam et al , (1991) .*
Acidity . TS , TN , SN , NPN AND F:where determined according to *Ling , (1963) .*

pH values.

It was determined in milk , whey rennet extracts directly by immersiany the electrode into these liquids .

For curd and cheese 10 gms were weighed and soflend with 10 ml distilled water to make homogeneous paste before immersianing the electrode . The determination was performed according to the British standard institution (B.S.I.,1976) .

Organoleptic properties judging .

It was assessed according to the scoring card recommended by *Naguib et al , (1974 b) .* giving the following points for the different properties

Flavor (60 points) , body and texture (30 points) and appearance (10 points) .

- Experiments were repeated 3 times and results were the mathematical average of 3 replicates.

RESULTS AND DISCUSSION

Gross chemical composition of cheese milk .

Gross chemical composition of cheese milk is shown in Table (1). It is clear that the addition of buffaloes milk (B) to cows milk (C) raised the fat to 4.7 % and the total Protein to 3.78 % , all treatments were made from mixed milk (B:C 1:1) , similar types of mixed milk were used by *Ismail (2001) and El Sharaihy (2008)*.

The Effect of type of rennet on some rheological properties:-

Table (2) deals with rennet clotting time , curd tension and syneresis of milk using chymosin, chicken-pepsin and admixtures of chymosin and pepsin, (50 : 50) , (70 : 30) and (90 : 10) under zero, 6 and 12 % salt.

For all treatments , as the salt concentration increased the MCT and curd tension decreased and syneresis also increased. Chymosin cloted the milk in shorter time (64 sec) while 100 % pepsin took the highest MCT (104 sec). As the pepsin content decreased to 50% the MCT decreased to (81 sec), when 30 % pepsin was used MCT decreased to (74 sec), when only 10 % pepsin admixed with 90 % maxrien (chymosin) also MCT decreased to reach (70 sec). The salt prolonged the MCT at 6 and 12 % salt MCT values were (150 / 171), (179 / 197), (165 / 186), (160 / 179) and (155 / 175 sec) for C , P, C : P (50 : 50) , C : P (70 : 30) and C : P (90 : 10) respectively. The chymosin as a rennet gave the highest curd tension value (44.90 gm), while pepsin gave the lowest value (32.60 gm). The addition of pepsin to chymosin decreased the curd tension to reach (35.80 gm) for (C : P 50 : 50).

For all treatments salt addition markedly decreased curd tension. Similar results were obtained by *Aly (1990), Madkor et al (1999), Mostafa et al (2000) and Salama (2004)*.

Syneresis values for zero% salt ranged between 21.82 and 14.97 ml the highest was for pepsin treatments, and the lowest was for chymosin treatment alone.

Table (1). Gross chemical composition of different types of cheese milk

Type of milk	composition						
	Acidity%	pH	T S%	Fat%	Fat / DM %	TP%	TP/DM
B	0.18	6.63	16.25	6.3	38.76	4.01	24.67
C	0.18	6.68	12.10	3.5	28.92	3.15	26.03
B:C (1:1)	0.18	6.65	14.75	4.7	31.86	3.78	25.56

B : Buffalo milk . C : Cow milk . B + C : Admixture of buffalo and cow milk (1:1) . DM : Dry matter TP : total protein .

Table (2):Effect of admixing Maxiren (pure chymosin) with chicken pepsin on some rheological properties of cheese milk .

Treatments	Salt %	MCT (seconds)	Curd Tension (gm)	Syneresis			
				30 (ml)	60 (ml)	120 (ml)	Total (ml)
Maxiren (pure chymosin) (C)	0	64	44.90	3.41	5.18	6.38	14.97
	6	150	32.62	4.77	6.30	7.60	18.67
	12	171	26.57	5.57	7.10	7.91	20.58
Chicken – Pepsin (P)	0	104	32.60	5.36	7.56	8.90	21.82
	6	179	23.40	7.10	9.80	10.14	27.04
	12	197	18.14	8.91	11.10	11.94	31.95
C : P 50 : 50	0	81	35.80	4.50	6.90	7.77	19.17
	6	165	27.80	5.30	7.00	7.86	20.16
	12	186	22.28	7.23	8.10	9.00	24.33
C : P 70 : 30	0	74	38.10	4.93	6.76	7.57	19.26
	6	160	29.00	6.10	7.50	8.32	21.92
	12	179	25.90	7.40	8.39	9.70	26.03
C : P 90 : 10	0	70	41.60	4.10	6.00	7.15	17.25
	6	155	31.60	5.25	6.90	7.40	19.55
	12	175	29.32	6.12	7.40	8.32	21.84

Effect of type of rennet on the yield of resultant Domiati cheese:-

Table (3) deals with the yield of different cheeses as affected by the type of rennet as well losses in yield during ripening. The yield of fresh cheese ranged between 24.60 and 26.80 %, the highest (26.80 %) was for chicken-pepsin and the lowest was for pure chymosin treatment . As the pepsin percentage increased the yield also increased. Addition of 50 % pepsin increased the yield from 24.60 % to 26.20 %. For all treatments as ripening period progressed the yield of the cheese decreased . Those results are in agreement with the earlier results of *Abd El_Salam et al (1981)*.

Losses in yeild continued up to the end of ripening and highly was for after 15 days, losses of cheeses at room temperature were 8.94 , 10.07 , 8.17, 7.25 and 7.11 % for C , P, C : P (50 : 50) , C : P (70 : 30) and C : P (90 : 10) respectively.. These results are in agreement with those obtained by *El_Hawary , Abd El_Salam et al , (1990) , El_Soda and saada, (1986) and El_Abassy and Wahba, (1986) .*

Table (3):Effect of type of rennet on the yield of white pickled cheese kept at room temperature .

Treatments		Ripening (days)					
		Room(25 ± 5°C)					
		Fresh	15	30	60	90	120
Maxiren (chymosin)	Y	24.60	22.40	21.55	21.00	20.20	19.60
	L	---	8.94	12.39	14.63	17.88	20.32
Pepsin	Y	26.80	24.10	23.00	22.30	21.70	21.00
	L	---	10.07	14.17	16.79	19.2	21.64
C : P 50 : 50	Y	26.20	24.60	23.00	22.10	21.40	20.70
	L	---	8.17	10.50	14.00	16.73	19.45
C : P 70 : 30	Y	25.70	24.30	23.80	23.00	22.50	21.80
	L	---	7.25	9.16	12.21	14.12	16.79
C : P 90 : 10	Y	25.30	23.50	22.60	21.90	21.00	20.40
	L	---	7.11	10.67	13.43	16.99	19.36

Y : yield L : loss

Effect of type of rennets on the moisture content of resultant cheese :-

Table (4) shows the moisture content of different treatments of cheese kept at room temperature during 120 days of ripening .For all treatments as ripening period progressed moisture content of the cheese decreased especially during the first 15 days old cheese .By the end of ripening moisture content of room temperature cheese were 50.77 , 53.10 , 51.68 , 52.49 and 52.97 % for C , P , (C : P 50:50) , (C : P 70:30) , and (C : P 90:10) respectively. Similar results were obtained by *Katsiari and Voutsianas (1994)*

Table (4):Effect of type of rennet on the moisture content different treatment throughout the 120 days of ripening .

Treatments		Ripening period (days)					
		Room temperature (25 ± 5) °C					
		0	15	30	60	90	120
(Chymosin) 100 %		36.75	40.88	41.57	42.73	43.49	44.25
Pepsin 100 %		34.59	37.19	39.24	40.42	41.22	41.89
C : P (50 : 50)		35.21	38.53	40.09	41.18	42.43	43.62
C : P (70 : 30)		34.90	37.77	38.59	38.59	39.54	40.25
C : P (90 : 10)		36.29	39.60	40.39	41.17	42.42	43.29

It is clear from Table (6) that as pepsin% increased the proteolysis parallelly increased. It is well known that chymosin is an enzyme mainly responsible for milk clotting and its role is very limited when it is pure on proteolysis. while pepsin has the double roles, milk coagulation and to great extent proteolysis. These results were in complete agreement with the results of *Ramasamy et al (1997)*.

Table (6):Effect of type of rennet on the soluble nitrogen and SN/TN of different cheese during 120 days of ripening .

Treatments	Ripening periods (days)						
	Room temperature (25 ± 5) °C						
	0	15	30	60	90	120	
(Chymosin) 100 %	*	0.102	0.162	0.198	0.245	0.267	0.290
	**	5.33	7.76	9.12	10.65	11.33	12.06
Pepsin 100 %	*	0.112	0.175	0.265	0.381	0.472	0.654
	**	6.91	9.83	13.88	18.95	22.38	30.00
C : P (50 : 50)	*	0.108	0.170	0.218	0.270	0.374	0.432
	**	6.39	9.44	11.52	14.01	17.96	20.00
C : P (70 : 30)	*	0.102	0.154	0.189	0.255	0.294	0.350
	**	5.93	8.28	10.16	13.28	14.77	16.97
C : P (90 : 10)	*	0.099	0.144	0.174	0.248	0.273	0.331
	**	5.41	7.38	8.61	11.86	12.58	14.71

* SN ** SN / TN

Effect of type Of rennet on the Non Protein Nitrogen (NPN) and NPN / TN of the cheese during ripening:-

The NPN contents and NPN / TN values were tabulated in **Table (7)**. Similar to SN, NPN took the same trend. As the ripening period progressed the NPN and NPN / TN values increased , as well , pepsin containing cheese showed higher values of NPN and NPN / TN. NPN of chymosin and pepsin treatments at room temperature values were (0.068 / 0.147), (0.085 / 0.183) and (0.094 / 0.206) for 60 , 90 and 120 days old Domiatti-like cheese. NPN / TN is also a measure of advanced proteolysis, values of NPN / TN behaved similarly as SN / TN , the increase of such values give predication to ripening as well the higher proteolysis and may be some of good flavor and may be bitterness, appeared , for old cheese NPN / TN of pepsin Domiatti-like cheese were 5.71 , 7.61 , 8.79 and 9.54% for 30 , 60 , 90 and 120 days old cheese.

Chymosin Domiati-like cheese at the same age were 2.56 , 2.96 , 3.62 and 3.88 % respectively. These results were in complete accordance with the results of *Ramasamy et al (1997)*.

The soluble nitrogen NPN and found in chymosin cheese may be owing to the minor activity of bacteria found in cheese. The pervious results were cofirmed by *El-Tobgui and Zaki (1991)*.

The marked increase in SN and NPN of pepsin cheese after 60 days may be owing to increase of cheese acidity; since pepsin group are more effective in acidic conditions. These results were in complete accordance with

the earlier results of *Hassan et al (1983)*, *Mehanna et al (1983)* and *El_Abassy and Wahba (1986)* .60 days old cheese kept at room temperature contained 0.245 , 0.381 , 0.270 , 0.255 and 0.248 % SN for C , P (C : P 50 : 50) , (C : P 70 : 30) and (C : P 90 : 10) % respectively. It is well known that SN / TN (ripening coefficient) is regarded as an important value for measuring ripening , as the value of SN / TN increased, this indicate higher level of maturation. From Table (6) it is clear that SN / TN of pepsin is markedly higher than those of chymosin cheese, for instance 90 days old cheese , pepsin SN / TN values were 22.83 % , while it was 11.33 % for chymosin cheese , nearly one half value of pepsin cheese. When 50 % pepsin mixed with 50 % chymosin the value reached 17.96 % for 90 days old cheese with an increase of 6.63 % . When pepsin represented 30 % of total rennet the value of SN / TN decreased to 14.77 % as compared with (50:50 C:P)rennet .(17.96%) On the other hand it is important to limit the proteolysis, because the very increase in SN, NPN and ammoniacal nitrogen, may result in certain types of bitterness .Similar trend of results were obtained by *El-Tobgui and Zaki (1991)*. *Abou_Sherife (2001)* .

Table (7):Effect of type of rennet on the Non protein nitrogen (NPN) and NPN/TN of resultant cheese during 120 days of ripening .

Treatments		Ripening periods (days)					
		Room temperature (25 ± 5) °C					
		0	15	30	60	90	120
(Chymosin) 100 %	*	0.011	0.028	0.049	0.068	0.085	0.094
	**	0.57	1.30	2.56	2.96	3.62	3.88
Pepsin 100 %	*	0.031	0.068	0.108	0.147	0.183	0.206
	**	1.83	3.77	5.71	2.61	8.79	9.45
C : P (50 : 50)	*	0.022	0.044	0.068	0.092	0.095	0.113
	**	1.30	2.44	3.60	4.77	4.67	5.23
C : P (70 : 30)	*	0.014	0.035	0.052	0.080	0.093	0.107
	**	0.81	1.97	2.80	4.17	4.67	5.19
C : P (90 : 10)	*	0.012	0.031	0.050	0.072	0.098	0.103
	**	0.66	2.07	2.47	3.44	4.10	4.58

* NPN ** NPN/TN

Effect of type of rennet on Formol No. and Total volatile fatty acid (TVFA) of cheese during ripening:-

Values of Formol No. and TVFA are tabulated in Table (8). It is well known that Formol No. and TVFA values are also regarded as ripening indices, in other word as TVFA and formol No. increased, these values indicate that ripening of the cheese is advanced. Form Table (8) it is clear that for all cheeses as ripening period advanced Formol No. and TVFA values are gradually increased. When 50% chymosin replaced by chicken pepsin values of T V F A increased to reach 22.5 , 25.2 and 28.0 for 60 , 90 and 120 days old cheese respectively. The increase of formal No. in pepsin cheese might be due to the higher proteolytic activity and acidity development of the cheese, also the increase in formal No. during ripening were strong during the first month of ripening. The obtained results were in agreement with those obtained with *Abd El_Hamid et al (1991)*, *Ramasamy et al (1997)* and

Abou Shrif (2001).

Although TVFA values are not mainly formed from protein analysis , values of TVFA were higher in pepsin treatment cheeses as compared with chymosin treatments being 11.9 , 13.1 and 16.8 % for 60 , 90 and 120 days of chymosin cheeses kept at room temperature. Respective values for pepsin cheeses were 14.8 , 17.2 and 21.4 % respectively. When 50 % chymosin were replaced by chicken-pepsin respective values decreased to reach 13.4 , 16.5 and 19.2 % respectively. This increase in TVFA for pepsin cheeses may be attributed to traces of lipases contaminated during the preparation of chicken pepsin or lipolytic enzymes from micro_organisms during the ripening period. The obtained results are with agreement of the same trend obtained by Hassan *et al* (1983), El-Soda *et al* (1990) and Taleb *et al* (1990).

Table (8):Effect of type of rennet on the Formol No . and total volatile fatty acids (TVFA) for resultant cheese during 120 days of ripening .

Treatments		Ripening periods (days)					
		Room temperature (25 ± 5) °C					
		0	15	30	60	90	120
(Chymosin) 100 %	*	6.5	10.9	13.9	17.5	21.0	24.7
	**	4.8	6.1	9.4	11.9	13.1	16.8
Pepsin 100 %	*	8.2	15.3	19.1	23.3	25.9	29.1
	**	6.2	8.4	12.0	14.8	17.2	21.4
C : P (50 : 50)	*	7.9	13.0	17.3	22.5	25.2	28.0
	**	5.4	7.1	11.2	13.4	16.5	19.2
C : P (70 : 30)	*	7.9	12.7	16.8	21.0	24.1	27.0
	**	5.2	6.8	10.7	12.8	15.8	18.6
C : P (90 : 10)	*	6.9	11.5	16.2	19.9	22.3	25.0
	**	5.0	6.9	10.2	12.2	14.2	17.3

*Formol No ** Total volatile fatty acids

Effect of type of rennet on the organoleptic properties of pickled soft white cheese kept at room temperature

The evaluations of different cheeses are found in Tables (9).Ten distinguished judges are selected to evaluate the quality of the cheese during ripening. Average of their scoring sheets were tabulated in Table (9) for pickled cheeses kept at room temperature. Scoring of cheese in general view carried out by methods of examining general appearance, flavor and body texture. In Domiatti cheese, there is no definite data to consume cheese, since it can be consumed either fresh or at any time throughout the ripening period which may extend from 1 month to a year depending on the demand of consumer and the need for local market.

In general for chymosin cheeses as the ripening time advanced, the scoring points increased the texture and the flavor improved. Chicken-pepsin cheese took another trend the optimum scoring points was for 60 days old cheese (90 of 100), then the judges gave less scores for flavor since slight

bitterness taste was detected and the texture changed from firm texture to loose texture and by the end of ripening bitterness was more pronounced and the flavor was refused by most judges. When 50 % of the chicken pepsin and 50 % of chymosin were applied the quality of the cheese was improved than cheese with 100% chicken-pepsin and the optimum scoring points was after 90 days of ripening at room temperature. 30% pepsin cheese was better than 50 % pepsin especially the body and the texture.

The use of 10 % pepsin highly improved the quality of the cheese and to some extent gave the highest scoring points in shorter time as compared with 100% chymosin cheese. *Abou Shrif (2001)* added 0.1 , 0.2 and 0.3 % chicken-pepsin to the pickling whey. The typical organoleptic properties were obtained after only one month of repining as compared with control cheese after 90 days as well the best concentration was 0.3 % for shorter time while longer ripening time obtained the lowest scores owing to over ripening. These results were in accordance with the results of *Wahba and El-Abbassy (1984)* and *Abd El-Hamid et al (1991)*.

Table (9):Organoleptic properties of Domiatti-like cheese as affected by type of rennet .

Treatments	Ripening period (days)	Room temperature (25 ± 5)°C			
		Flavor	Body Texture	Appearance	Total Scores
		60	30	10	100
(Chymosin) 100 %	0	34	20	8	62
	15	39	24	8	71
	30	41	26	8	75
	60	45	27	8	80
	90	48	27	9	84
	120	51	28	9	88
Pepsin 100 %	0	33	19	8	60
	15	38	23	8	69
	30	44	25	8	77
	60	51	25	9	85
	90	43	23	7	73
	120	44	20	6	70
C : P (50 : 50)	0	34	21	7	62
	15	42	25	8	75
	30	46	26	8	80
	60	48	25	9	82
	90	51	26	9	86
	120	45	22	8	75
C : P (70 : 30)	0	32	21	7	60
	15	40	24	8	72
	30	45	26	8	79
	60	47	26	9	82
	90	51	27	9	87
	120	43	24	8	75
C : P (90 : 10)	0	32	22	7	61
	15	40	24	8	72
	30	44	25	8	77
	60	48	26	8	82
	90	50	27	9	86
	120	53	28	9	90

Generally addition of pepsin to chymosin required less ripening period to have acceptable organoleptic properties and if 100% chicken-pepsin were used for Domiati-cheese production it is preferable to mature the cheese under refrigerator conditions. after 90 days. 10 % pepsin gave the highest scoring points among all treatments after 120 days. In other word the addition of 10 % pepsin to 90 % chymosin highly improved the quality of pickled cheese. From Tables (9) the type of rennet had no marked effect on the color and appearance of the cheese. These results were with agreement to those reported by *Ismail (2001) and El-Sharaihy (2002)* .

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تأثير استخدام مخاليط من الكيموسين و البيسين على خواص الجبن الـدمياطي

محمد الهوارى*، ابراهيم بكري** و عبد الستار الغنـدور***

* كلية الزراعة – جامعة طنطا

** كلية الزراعة – جامعة الفيوم

*** معهد بحوث الأنتاج الحيوانى

نظراً لعدم ذبح العجول الصغيرة حدثت أزمة في المنفحة مما دفع الأبحاث الكثيرة إلى إنتاج المنافح من مصادر مختلفة مثل المصادر الميكروبية والإتجاه إلى إستخلاص الإنزيمات المجبنة من الدواجن ومصادر أخرى . وكما هو معروف أن الكيموسين النقي له المقدرة العالية على تجبن اللبن وإعطاء قوام متماسك إلا أن تأثيره على التسوية ضعيف – بينما عند إستخدام البيسين المستخلص من الدواجن فإنه يؤدي إلى تجبن اللبن ولكن القوام ضعيف للجبن ويسرع التسوية – وأحياناً يظهر الطعم المر .

ويهدف هذا البحث إلى إستخلاص المنفحة (البيسين) من قوانص الدجاج – حيث يذبح منها حوالي مليون فروج يومياً . وعند خلطة بمنفحة الكيموسين النقي المعروف تجارياً الـMaxiren للحصول على جبن دمياطى مقبول الطعم والقوام . وقد أختيرت نسب مختلفة من خلط الكيموسين (C) والبيسين (P) كالأتى (50:50) ؟ (70:30) ؟ (90:10) % (C:P) – وتم إستخدام لبن خليط جاموسي إلى بقرى بنسبة (1:1) وتم تخزين الجبن الناتج على درجة حرارة الغرفة لمدة ١٢٠ يوماً .

وأظهرت النتائج أن إستخدام البيسين أدى إلى زيادة الريع فى الجبن وسرعة تحلل البروتين وتحليل البروتين وكان القوام أقل جودة بمقارنته بالجبن الناتج من إستخدام الكيموسين وأعطى الجبن طعماً مرّاً مع زيادة فترة التسوية - ولكن عند خلط الكيموسين مع البيسين أدى ذلك إلى تحسين صفات الجبن وتقشير فترة التسوية - وكانت أحسن نسب خلط للمنفحة للحصول على جبن جيد على درجة حرارة الغرفة هى نسبة 90:10 % (C:P) . كيموسين إلى بيسين .

قام بتحكيم البحث

كلية الزراعة – جامعة المنصورة

كلية الزراعة – جامعة الأسكندرية

أ.د / طه عبد الحليم نصيب

أ.د / يحيى ابراهيم عبد القادر