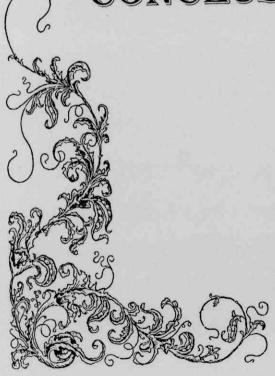


SUMMARY AND CONCLUSIONS



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Permeate is a solution which penetrates the membrane during ultrafiltration processing of milk or whey. Permeate consists mainly of lactose, which usually sufficient to growth requirements of lactic cultures fermentation as a carbon source; beside, it contains NPN, minerals and vitamins. From the economic point of view, the use of cheap permeates to replace the expensive import media and consequently, increase the net profit.

Therefore, this investigation was planned to throw some light on the possibility of using permeate as a cheap culture medium comparing with Nutrient agar. Also, from the nutritional aspects, it can use in making yoghurt.

Thus, the work was carried out in four parts:

Part I: The composition of permeate

The used permeate was analyzed for total solids, fat, total nitrogen, lactose, monosaccharides, ash, acidity% and pH value.

Minerals were also determined in the same samples by the Atomic Absorption Spectophotometry.

Also, the amino acids of permeate was determined by GLC apparatus.

Part II: Utilization of permeate as a culture medium:

In this part, some factors which may affect using the permeate as a culture medium for the total bacterial count of milk were studied and compared with the standard Nutrient agar medium.

The results were summarized as follows:

- 1- The efficiency of permeate agar as a medium for bacterial count of milk compared with Nutrient agar clear that it was very poor and the bacterial count of milk was 4.2 and 92 x 10⁴, respectively.
- 2- The C/N ratio was 48/1 and 8/1 in permeate agar and Nutrient agar media consequently.

- 3- The effect of different heat treatments on the amino acids, lactose and monosaccharides in permeate were studied by heating permeate at 90°C for 15 sec., heating at 100°C/20 min for 3 days (Arnold), heating 110°C for 15 min (Autoclave) and heating at 120°C for 15 min (Autoclave) compared with fresh permeate.
 - a) All amino acids reduced with increasing the temperature. Loss of amino acids was increased by the severity of heat treatment, especially the available lysine.
 - b) Addition of lysine to the permeate agar increased the bacterial count of milk.
 - c) Different heat treatments affected on lactose content as it was gradually decreased by increasing the temperature with/and time. The monosaccharides content were increased by increasing the temperature with/and time.

Part III: Fortification of permeate with some nitrogen sources to increase the soluble nitrogen in the medium:

In this respect, some trials carried out and the results can be summarized as follows:

- 1- Permeate agar was supplemented with 5, 7.5m 10 g peptone and 10 g peptone + 3 g beef extract per liter, then sterilized by Autoclave and Arnold. The results indicated that addition of peptone as a soluble nitrogen source improved the C/N ratio, thus, it enhanced the bacterial growth proportionally with the amount of peptone.
- 2- Permeate agar was fortified with 5, 10 and 15% skim milk. There were two treatments in this respet.
 - a) The skim milk was added to permeate agar, then the media were sterilized together.
 - b) The skim milk and permeate agar were sterilized by Autoclave and Arnold separately before the addition.

It was found that adding skim milk to permeate agar induced some improvements of the counted bacteria especially when added separately to sterilized medium to avoid the effect of Maillard reaction in addition to improving C/N ratio.

- 3- Permeate agar was fortified with 5, 10, 15 and 20 g baker's yeast/Liter. There were two treatments in this respect.
 - a) The baker's yeast was added to permeate then the medium boiled after direct addition and sterilized by Autoclave and Arnold.
 - b) After the addition of baker's yeast, the pH adjusted to 4.5 and incubated at 37°C for 15 min then the media prepared and sterilized by Autoclave and Arnold.

The addition of baker's yeast to permeate medium followed by a short time of incubation at 37°C/15 min was found to be the best treatment as an activation period to reduce the formation of any inhibitory substances. Thus, may achieve increasing the permeate ability for promoting growth of milk bacteria.

4- Permeate was fortified with different amounts of whey protein (5, 10 and 15 g/Liter) digested by different levels of liquid rennet (1 and 3 ml/Liter) to

increase the soluble nitrogen. The results reveal that a noticeable increase in counts were induced with supplementing the permeate with different amounts of whey proteins treated with rennet.

The best result was obtained with adding 5 g whey/L. of permeate, adjusting pH to 6.8 and then treated by 1 ml commercial rennet/L for 24 hrs at 37°C before the usual preparation of medium.

5- Permeate supplementation with 5, 10 and 15% yoghurt starter increased the bacterial count. The best result was achieved by the addition of 10% starter and incubation for 1 hr.

In all previous experiments, the media were sterilized by the usual Autoclave method and Arnold method. It was found that the growth of bacteria always more better when Arnold method used than the Autoclave method.

Part IV: Utilization of permeate in making yoghurt:

Permeate was used in reconstituting full-cream milk powder with different levels. The resultant was

used in making yoghurt. The proportion of permeate to water used were:

Treatment 1: 0% permeate: 100% water.

Treatment 2: 25% permeate: 75% water.

Treatment 3:50% permeate:50% water.

Treatment 4: 75% permeate: 25% water.

Treatment 5: 100% permeate: 0% water.

The yoghurt was manufactured and analysed for gross chemical composition, coagulum strength (firmness) and organoleptically when fresh and after storing in refrigerator for 5 and 10 days.

The results can be summarized as follows:

- 1- Total solids and lactose contents of yoghurt were increased by increasing the amount of permeate used, while storing caused a gradual reduction in them.
- 2- No obvious changes in fat content of different treatments and also during storage.
- 3- A slight increase in protein content was observed with increasing the permeate level and also with prolonging the storage period.

- 4- No clear trend was occurred in acidity%, due to different levels of permeate in yoghurt. But, there was increase in acidity% in all treatments during storage.
- 5- The pH of yoghurt slightly decreased as the proportion of permeate increased and also during storage.
- 6- Increasing the level of permeate in yoghurt lower the penetrometer reading which means more firmness of the coagulum. Also, storage caused the same effect.
- 7- The organoleptic evaluation of yoghurt reveals that.

Data of organoleptic properties show that the scores of yoghurt were affected by the level of permeate used. The appearance and body and texture were improved by increasing of permeate up to 75%. In respect of flavour, the increase of permeate gave a sweetness taste which was undesirable in yoghurt. But, adding fruit flavours (Banana and Apricot) overcomed this problem and improved the flavour.