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Evaluation of Microbial Quality and Shelf Life of Egg Based Whey Beverage

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ABSTRACT

This study was conducted to evaluate the microbiological qualities and shelf life of egg based whey beverage. There were three levels of egg percentage like 4% (A1), 6% (A2) and 8% (A3) with three different types of essence as Mango (B1), Orange (B2) and Kewada (B3) added for preparation of egg based whey beverage. These samples were stored at 0 day (C1), 5 days (C2), 10 days (C3), 15 days (C4) and 20 days (C5). These samples were stored at 5^0 C as refrigerated temperature. There were three species of microorganism (standard plate count X 10^5 Cfu/g, coliform count X 10^2 Cfu/g and yeast & mould count X 10^2 Cfu/g) which were contaminated after production of egg based whey beverage and then evaluated. This process was replicated three times. On the basis of microbial quality of egg based whey beverage it was concluded that there was 6% egg, Orange essence combination found to be superior over all other combinations at fresh day but there was no significant deterioration noticed up to 20 days of storage period at 5^0C of refrigeration temperature, but superior shelf life of egg based whey beverage was found up to 0-5 day of storage.

Key words: *Microbial qualities, Shelf life, Whey beverage, Egg.*

INTRODUCTION

Dairy industry has developed a large scale of new, nutritionally improved products which have achieved a very good success on the market. Therefore traditional dairy products as we have known them for ages are evolving into the new generation of dairy products with different characteristics and better health and nutritional properties. Whey based beverages belong certainly to this group of new products, although whey as a by-product in cheese manufacture is often disposed off as waste or used as provender. Whey is a nutritious by product from cheese, chhana and paneer industry containing valuable nutrients like lactose, proteins, minerals and vitamins etc. which have indispensable value as human food.

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Whey constitutes 45-50% of total milk solids, 70% of milk sugar (lactose), 20% of milk proteins and 70-90% of milk minerals and most importantly, almost all the water soluble vitamins originally present in milk[6].

In India, it is estimated that about 100 million kg of whey is annually derived as a byproduct which may cause substantial loss of about 70,000 tonnes of nutritious whey solids[10]. Considerable work has been done throughout the world to utilize whey for production of whey protein concentrate (WPC), whey powder, lactose, lactic acid, whey paste etc[9].

The conversion of whey into beverages through fermentation or without fermentation is one of the most attractive avenues for the utilization of whey for human consumption. In terms of functionality, whey protein enhances protein content of beverage while improving its quality. The production of a beverage from whey butter cheese and acerola juice has been shown to have good commercialization potential, uniting the benefits provided by the former with those of later, including the ingestion of essential amino acids and increasing the vitamin C content, resulting in a product of differentiated nutritive value[3,12]. Present status of milk production of India is 127.9 million tonnes and per capita per day availability is about 291 grams[8].

Whey may be considered as the watery substances remaining after coagulation of the casein in the milk, either through the addition of acid (in casein manufacture) or through addition of protease such as chymosin (in cheese manufacture). The composition of whey will vary considerably depending on the source of milk and the manufacturing process involved. According to its average composition whey is approximately 93% water and contains about 50% of total solids present in the milk of which lactose is the main constituent. Whey proteins constitute less than 1% of dry matter[2]. Whey response a heterogeneous pools of proteins with wide ranging physico-chemical and functional properties. It is a complete protein with the presence of all essential and non essential amino acids.

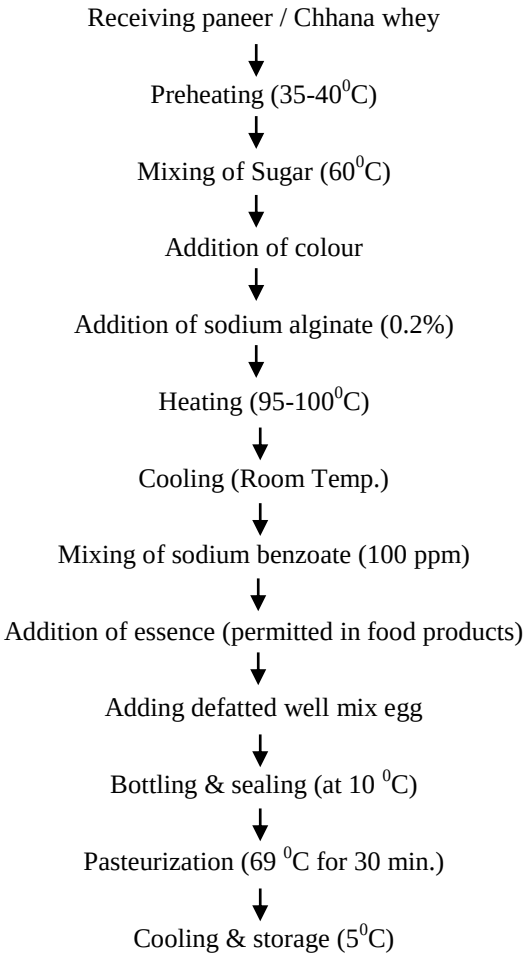
Eggs are laid by female animals of many different species, including birds, reptiles, amphibians, and fish, and have been eaten by humans for thousands of years. Bird and reptile eggs consist of a protective eggshell, albumen (egg white), and vitellus (egg yolk), contained within various thin membranes. Popular choices for egg consumption are chicken, duck, quail, roe, and caviar, but the egg most often consumed by humans is the chicken egg, by a wide margin.

Egg yolks and whole eggs store significant amounts of protein and choline, and are widely used in cookery. Due to their protein content, the United States Department of Agriculture (USDA) categorizes eggs as Meats within the Food Guide Pyramid[2]. Despite the nutritional value of eggs, there are some potential health issues arising from egg quality, storage, and individual allergies.

Although whey has become much too valuable to be disposed of on a large scale, there are still many smaller and isolated cheese manufacturing operations where whey disposal can be a major economical and/or ecological burden. Where industrial whey processing or manufacture of high value consumer products is not feasible, other methods of whey disposal must be selected, based mainly on the associated cost.

METHOD AND MATERIALS

Manufacture egg based whey drink



There were three levels of egg percentage like 4% (A1), 6% (A2) and 8% (A3) with three different types of essence as Mango (B1), Orange (B2) and Kewada (B3) added for preparation of egg based whey beverage. These samples were stored at 0 day (C1), 5 days (C2), 10 days (C3), 15 days (C4) and 20 days (C5). These samples were stored at 5^0 C as refrigerated temperature. There were three species of microorganism (standard plate count X 10^5 Cfu/g, coliform count X 10^2 Cfu/g and yeast & mould count X 10^2 Cfu/g) which were contaminated after production of egg based whey beverage and then evaluated. This process was replicated three times. The pure plate method of BIS was followed to estimate the standard plate count (SPC), for this readymade plate count agar media of Himedia Laboratories, Mumbai- 400086. Violet Red Bile Agar (VRBA) used to estimate the coliform count and Potato Dextrose Agar (PDA) used for yeast & mould count[1]. The data on sensory and chemical quality obtaining during the study were subjected for analysis of variance (ANOVA) as described by Snedecor and Cochran[13].

RESULTS AND DISCUSSIONS

Standard plate count Number (X10^5/10 ml)

The mean maximum (4.27) and the minimum (3.55) number were observed in case of egg based whey beverage prepared by using 8% egg and 4% level of egg, respectively. The differences in SPC were found to be significant ($P<0.05$, CD=0.013) due to egg levels. All the variables were significantly differed from each other. The mean maximum number (4.35) was found in kewda essence

while the minimum (3.45) numbers were observed in case of egg based whey beverage prepared by orange essence. The differences in SPC were found to be significant (P<0.05, CD=0.013) due to essence levels All the variables were significantly differed from each other. The mean maximum number (4.37) was found at 20 days, while the minimum (3.47) numbers were observed in case of egg based whey beverage stored for 0 day at the temperatures of 5^0C of refrigeration. The differences in SPC were found to be significant (P<0.05, CD=0.016) due to storage periods. All the variables were significantly differed from each other. The combination of A3XB3xC3 got maximum number (5.21) whereas the least number (2.71) found in A1xB2xC1. The highest number found in the sample which was prepared by using 8% egg with mango essence and stored at 20 days while lowest number found in sample which was prepared by using 4% egg with orange essence at 0 day of storage. These results were found to be statistically non-significant (P>0.05)[11,14].

Coliform count Number (X10^2/10 ml)

The coliform bacteria were not detected in all the samples of egg based whey beverage. During the course of investigation the beverage samples were prepared in the laboratory under strictly control hygienic condition[7].

Yeast and mould count Number (X10^2/10 ml)

The mean maximum (3.68) and the minimum (1.57) number were observed in case of egg based whey beverage prepared by using 8% egg and 4% level of egg, respectively. The differences in yeast and mould count were found to be significant (P<0.05, CD=0.009) due to egg levels. All the variables were significantly differed from each other. The mean maximum number (3.11) was found in mango essence while the minimum (1.97) numbers were observed in case of egg based whey beverage prepared by kewda essence. The differences in yeast and mould count were found to be significant (P<0.05, CD=0.009) due to essence levels. The mean maximum number (6.52) was found at 20 days, while the minimum (0.00) numbers were observed in case of egg based whey beverage stored for 0 and 5 days day at the temperatures of 5^0C of refrigeration. The differences in yeast and mould count were found to be significant (P<0.05, CD=0.012) due to storage periods. The combination of A3xB1xC5 got maximum number (10.67) whereas the least number (0.00) found in all combinations at 0-5 days of storage periods. The highest number found in the sample which was prepared by using 8% egg with mango essence at 20 days of storage. These results were found to be statistically significant (P>0.05, CD=0.035)[4,5].

Table 1: microbial quality of egg based whey beverage

combinations	SPC	Coliform count	YMC
A1B1C1	3.21	0	0
A1B1C2	3.31	0	0
A1B1C3	3.61	0	0
A1B1C4	3.81	0	2.67
A1B1C5	4.01	0	5.67
A1B2C1	2.71	0	0
A1B2C2	2.81	0	0
A1B2C3	3.11	0	0
A1B2C4	3.31	0	2.67
A1B2C5	3.51	0	4.33
A1B3C1	3.61	0	0
A1B3C2	3.71	0	0
A1B3C3	4.01	0	0
A1B3C4	4.21	0	3.33
A1B3C5	4.41	0	5
A2B1C1	3.51	0	0
A2B1C2	3.71	0	0
A2B1C3	3.91	0	3.33
A2B1C4	4.11	0	5.33
A2B1C5	4.41	0	7.67
A2B2C1	3.01	0	0
A2B2C2	3.21	0	0

A2B2C3	3.41	0	0
A2B2C4	3.61	0	4.33
A2B2C5	3.91	0	5.67
A2B3C1	3.91	0	0
A2B3C2	4.11	0	0
A2B3C3	4.31	0	1.33
A2B3C4	4.51	0	2.33
A2B3C5	4.81	0	4.67
A3B1C1	3.81	0	0
A3B1C2	4.01	0	0
A3B1C3	4.31	0	3.33
A3B1C4	4.71	0	8
A3B1C5	4.81	0	10.67
A3B2C1	3.31	0	0
A3B2C2	3.51	0	0
A3B2C3	3.81	0	4.33
A3B2C4	4.21	0	7.33
A3B2C5	4.31	0	8.67
A3B3C1	4.21	0	0
A3B3C2	4.41	0	0
A3B3C3	4.71	0	2.33
A3B3C4	5.11	0	4.33
A3B3C5	5.21	0	6.33

CONCLUSIONS

On the basis of microbial activity, it was noticed that least number of SPC were found in 6% egg and Orange essence over all other combinations at fresh day, while the interaction combination of in 6% egg and Orange essence at 0 day, Orange essence at 0 day at fresh day got the least SPC and also found to be superior over all other interactions, while coliform count was found to nil in all treatment and interactions but yeast and mould count found to least in 6% egg and Orange essence treatments at 0-5 days of storage. On the basis of microbial quality of egg based whey beverage it was concluded that there was 6% egg, Orange essence combination found to be superior over all other combinations at fresh day but there was no significant deterioration noticed up to 20 days of storage period at 5^0C of refrigeration temperature, but superior shelf life of egg based whey beverage was found up to 0-5 day of storage.

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