CHEMICAL QUALITY OF CHHANA SPREAD PREPARED FROM COW MILK USING HERBAL COAGULANTS

ABSTRACT

The current study was carried out at the C.S.A. University of Agriculture and Technology Kanpur's department of Animal Husbandry and Dairying (Dairy Technology). Chhana spread is a popular acid coagulated milk product has fairly high nutritional value. Its mild acidic flavour, soft body and smooth texture make it highly suitable for consumption .In the experiment, chhana spread was made with cow milk with three different coagulant agents (aonla extract, lemon extract, and ginger extract), two different water-herbal coagulant ratios (90:10 and 80:20), and two different storage periods (0 and 10 days) at 5°C refrigeration temperature. Moisture, Fat, Protein, Lactose, and Ash are five chemical characteristics. The chemical quality of chhana spread made from cow milk utilising herbal coagulants was shown to be better than other spreads after a fresh day storage period, according to the study.

Keywords: Herbal coagulants (Aonla, Lemon, and Ginger extract), Cow milk, Spread and chemical attributes.

Introduction

Spread is a breakfast meal that is spread on bread, toasts, biscuits, chapatti, and other similar items. Because of their appealing flavour and nutritional content, dairy spreads such as butter and processed cheese are favoured in India over non dairy spreads. Chhana is a popular acid coagulated milk product in India that has a high nutritional value. Its moderate acidic flavour, soft body, and silky texture make it ideal for spreadability. The creation of low-fat and low-calorie spreads has sparked a lot of attention in recent years. At the moment, there are primarily two types of spreads on the market: butter and cheese spreads, which are typically served with toast for breakfast. Butter spread is not preferred by abbess people or those who suffered from heart disease because it is high in animal fat, whereas cheese spread is suitable for consumers of all ages, but its use is limited to a small section of society who have western taste due to its peculiar pungent flavour that does not suit the Indian palate and also due to its high cost. Recently, a spread made from chhana was developed, which has a good taste and has considerably less animal fat, and is preferred over other spreads due to its nutty flavour.

Chhana spread, a milk product, is increasing popularity in terms of manufacturing and consumption. Chhana, also known as paneer, is a heat and acid coagulated indigenous milk product that serves as the foundation for a variety of classic Indian desserts such as Rasogulla, Sandesh, and Rasmalai. It's also been used as a base for a wide range of gourmet specialties. It is believed to have originated in India's eastern region.

Chhana or paneer is a cheese made from cow or buffalo milk, or a combination of cow and buffalo milk, that is precipitated with sour milk, lactic acid, or citric acid (both the synthetic and herbal

coagulants). It can't have more than 70% moisture in it, and the milk fat content can't be less than 50% of the dry matter foundation. It's also possible to make this product with milk solids (PFA, 1976).

Calcium, phosphorus, and vitamins (A, B, B2, and C) content per 100g of chhana samples were observed to be 208 mg, 138 mg, 3.66 IU, 73 grammes, 15 grammes, and 2.8 grammes, respectively. Chhana was said to have almost no nicotinic acid in it. When compared to boiled milk, the loss of ascorbic acid during chhana preparation was reported to be around 57 percent. (1955, Mani *et* al.)

Materials and Procedures

The current experiment was conducted at Kanpur's Chandra Shekhar Azad University of Agriculture and Technology's Department of Animal Husbandry and Dairying. The university dairy farm provided the cow milk. The Chhana spread manufacturing procedure was standardised based on the many criteria under investigation, and the finished product's chemical characteristics were assessed. Herbal coagulants were used, such as aonla extract, lemon extract, and ginger extract, among others. The chhana spread was prepared using refined commercial grade Tata brand salt.

Method of manufacturing of chhana spread

The cow milk was cooked over an open fire in a karahi (80^0C). A ladle was used to swirl the milk throughout the heating process to prevent it from burning. When the milk reached (80^0C), it was stopped heated and cooled to (70^0C) before coagulation. Then, coagulation with a (10% or 20%) solution of herbal coagulants was progressively added to the milk with stirring until complete coagulation occurred. After coagulation, the contents were poured over a clean muslin cloth for whey straining, and the whey was allowed to drain for roughly an hour without the application of external pressure.Chhana was collected and weighed after the whey was drained. After being weighed, the chhana is broken into small pieces and put to a household mixer, where it is blended into a paste with common salt (1.5%) and water (10-20ml/100g chhana). Finally, the chhana spread was gathered and stored in plastic cups. Refrigeration was used to keep the samples cool (5^0C).

Flow diagram from manufacturing of chhana spread from cow milk chhana using herbal coagulants

Cow milk

↓

Warming of milk (at 40^0C)

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Filtration/clarification

↓

Heat treatment (at 80^0C)

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Cooling of milk (at 70^0C)

↓

Addition of coagulants (herbal 10% and 20%)

↓

Whey

↓

Draining of whey

↓

Chhana

↓

Chhana spread

↓

Packaging

↓

Storage (at 5 ± 1^0C)

Results and Discussion

The AOAC (1980) techniques were used to assess the chemical purity of the chhana spread. The moisture content of chhana spread was determined using the AOAC (1980) technique. The protein was determined using the micro-kjedahl technique. Gerber's method of BIS (1981) was used to determine the fat content of milk. AOAC (1984), in the department of Animal Husbandry and Dairy, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, assessed the carbohydrate content. The findings and discussion of this inquiry have been presented under the following headings.

1-Moisture percentage

The highest moisture percentage of chhana spread (61.150) was identified in sample ($A_2B_1C_1$), while the lowest percentage (58.963) was observed in sample ($A_3B_1C_2$). Due to varying quantities of coagulant, the essential variation in moisture percentage was found to be non-significant at the 5% level

of significance. When the CD values were examined further, it was discovered that factor C was much greater than the other groups, and that all of the groups differed from one to another.

Table No. 1(A): A×B×C combination value for moisture percentage.

Treatment	A_1		A_2		A_3	
	B_1	B_2	B_1	B_2	B_1	B_2
C_1	60.623	60.753	61.150	60.530	60.660	60.507
C_2	59.633	59.573	59.510	59.023	58.963	59.070
C.D.		NS			**NS**	

Table No. 1(B): Average moisture content value of chhana spread as affected by different coagulants (A), there levels of coagulant (B) & storage periods (C).

Treatment	**B_1**	**B_2**	**C_1**	**C_2**	**Mean**
A_1	60.128	60.163	60.688	59.603	60.145
A_2	60.330	59.777	60.840	59.267	60.053
A_3	59.812	59.788	60.583	59.017	59.800
B_1			60.811	59.369	60.090
B_2			60.597	59.222	59.909
Mean	60.090	59.909	60.703	59.295	
C.D.	(A×B) NS		(A×C) NS		(B×C) NS

In terms of coagulant levels, the maximum moisture percentages (60.330) of chhana spread were found in the A_2B_2 sample, while the smallest moisture percentage (59.777) was identified in the A_2B_2 sample. At a 5% level of significance, the essential difference in moisture percentage (P0.05, CD=NS) was found to be non-significant. The moisture percentage reduces with increasing storage period due to the storage period effect.

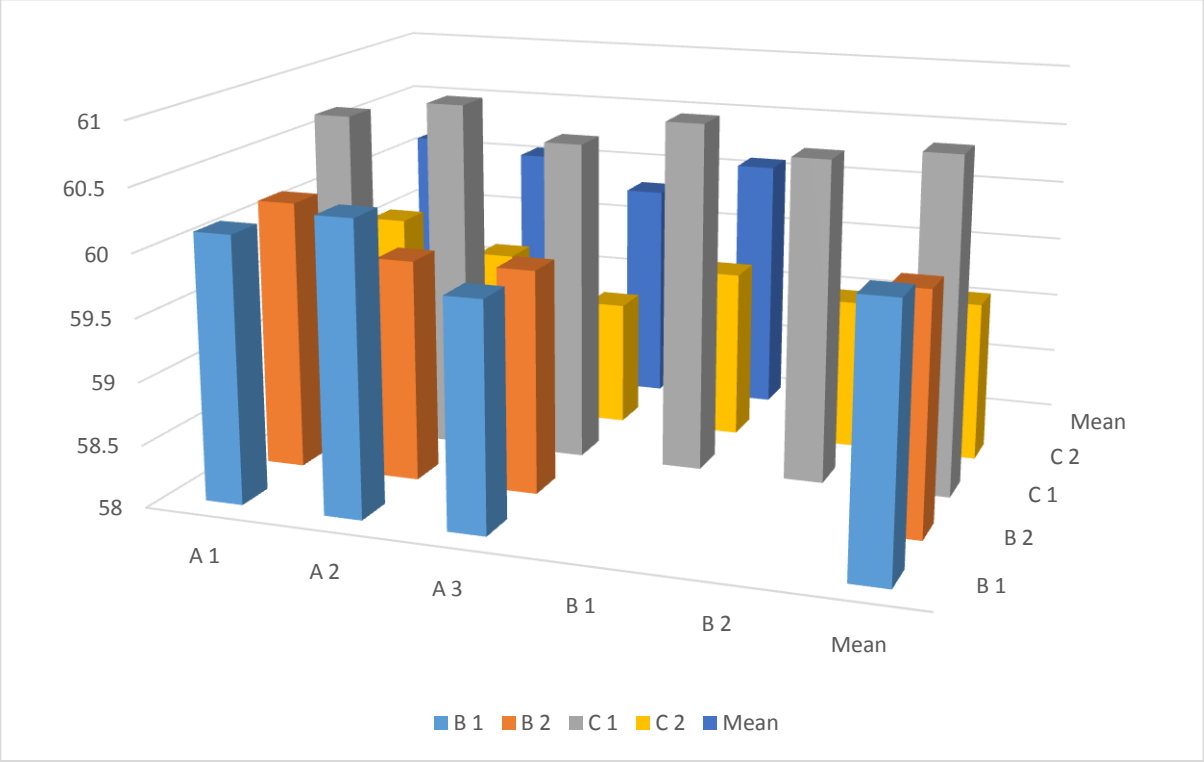

Fig. 1: Average Moisture content of chhana spread using herbal coagulants (A) as affected by different levels of coagulant(B) and storage periods (C).

2-Fat percentage

The highest fat percentage of chhana spread (23.720) was identified in sample ($A_2B_2C_2$), while the lowest percentage (20.707) was observed in sample ($A_2B_1C_1$). As the ideal coagulant level grew, the fat percentage of chhana spread increased. Due to varying levels of coagulant, the key difference (P0.05, CD=NS) in fat percentage was found to be non-significant at the 5% level of significance.

Table No. 2(A): A×B×C combination value for fat percentage.

Treatment	A_1		A_2		A_3	
	B_1	B_2	B_1	B_2	B_1	B_2
C_1	22.083	21.827	20.707	22.133	21.613	21.730
C_2	23.437	23.110	22.533	23.720	23.280	23.363
C.D.		NS				

Table No. 2(B): Average fat content value of chhana spread as affected by different coagulants (A), there levels of coagulant (B) & storage periods (C).

Treatment	B_1	B_2	C_1	C_2	Mean
A_1	22.760	22.468	21.955	23.273	22.614
A_2	21.620	22.927	21.420	23.127	22.273
A_3	22.447	22.547	21.672	23.322	22.497
B_1			21.468	23.083	22.275
B_2			21.897	23.398	22.647
Mean	22.275	22.647	21.682	23.240	
C.D.	(A×B) 0.785		(A×C) NS		(B×C) NS

In terms of the varied amounts of coagulant, B_2C_2 had the highest fat percentage (23.398) of chhana spread, whereas B_1C_1 had the lowest fat percentage (21.468). At a 5% level of significance, the results were non-significant. At a 5% level of significance, the key difference in fat percentage (P0.05, CD=NS) was shown to be non-significant. Further analysis of CD values revealed that factor AXB was much higher in comparison to the other groups, and that all of the groups differ from one to another. Chemical activities have an inverse effect on the quality of chhana spread during storage.

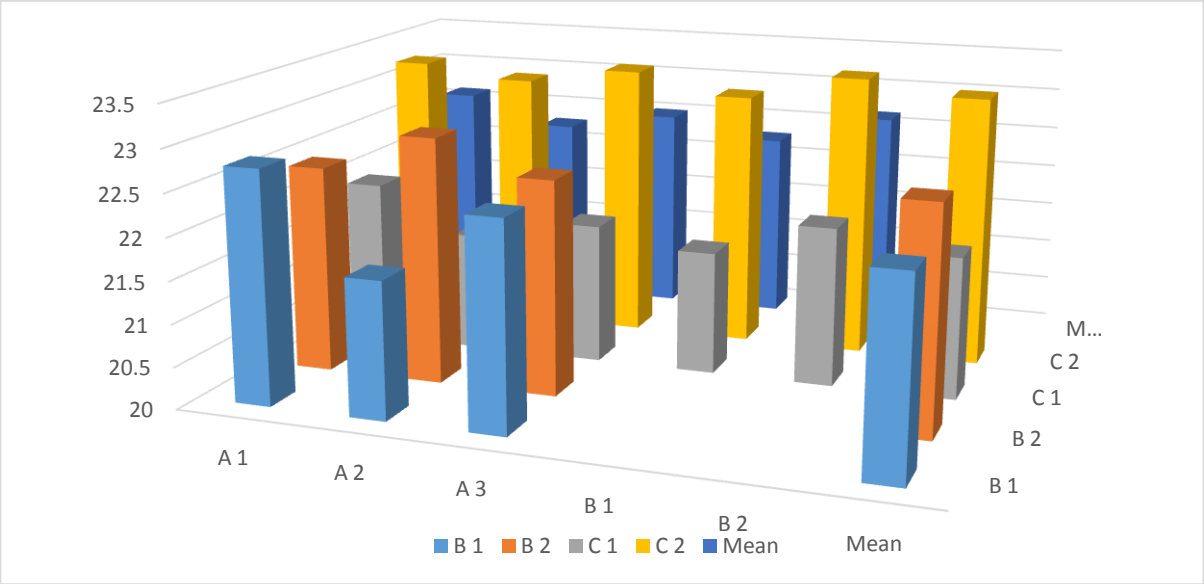

Fig. 2: Average Fat content of chhana spread using herbal coagulants (A) as affected by different levels of coagulant(B) and storage periods (C).

3-Protein percentage

The highest protein percentage of chhana spread (14.677) was detected in sample ($A_2B_1C_1$), while the lowest percentage (14.140) was observed in sample ($A_1B_1C_2$). As the ideal coagulant level grew, the protein percentage of chhana spread increased. Due to varying levels of coagulant, the key difference (P0.05, CD=NS) in protein percentage was found to be non-significant at the 5% level of significance. Further analysis of CD values revealed that factor AXB was much higher in comparison to the other groups, and that all of the groups differ from one another. The highest protein concentration was found in the A1B1 sample, which also had the highest chhana ratio.

Table No. 3(A): A×B×C combination value for protein percentage.

Treatment	A_1		A_2		A_3	
	B_1	B_2	B_1	B_2	B_1	B_2
C_1	14.293	14.287	14.677	14.270	14.493	14.463
C_2	14.140	14.183	14.523	14.190	14.423	14.367
C.D.		NS				

Table No. 3(B): Average protein content value of chhana spread as affected by different coagulants (A), there levels of coagulant (B) & storage periods (C).

Treatment	**B_1**	**B_2**	**C_1**	**C_2**	**Mean**
A_1	14.217	14.235	14.290	14.162	14.226
A_2	14.600	14.230	14.473	14.357	14.415
A_3	14.458	14.415	14.478	14.395	14.436
B_1			14.488	17.362	14.425
B_2			14.340	14.247	14.293
Mean	14.425	14.293	14.413	14.304	
C.D.	(A×B) 0.199		(A×C) NS		(B×C) NS

In terms of coagulant levels, the highest protein percentages (14.600) of chhana spread were discovered in A_2B_1, while the lowest protein percentage (14.217) was observed in A_1B_1. At a 5% threshold

of significance, the outcomes differed significantly. At the 5% level of significance, the critical difference in protein percentage (P0.05, CD=0.199) was confirmed to be significant.

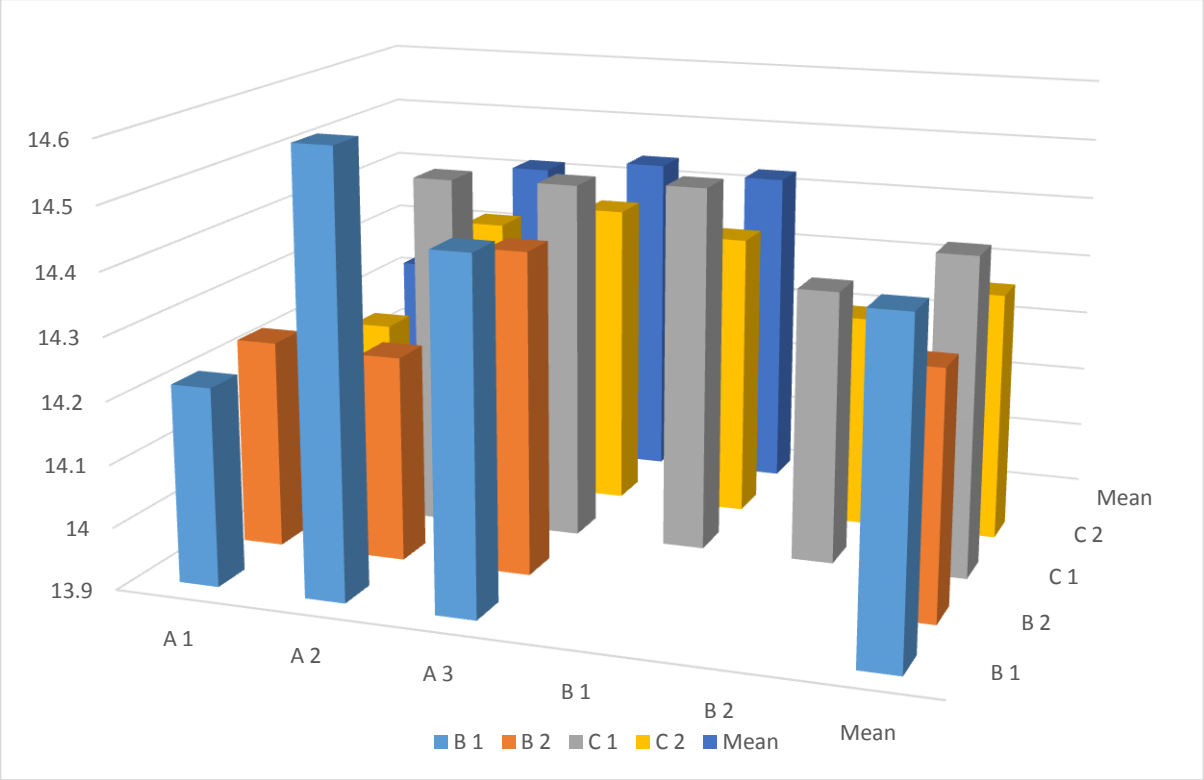

Fig. 3: Average Protein content of chhana spread using herbal coagulants (A) as affected by different levels of coagulant (B) and storage periods (C).

The influence of various BXC combinations on protein percentage was detected. The highest protein percentage of chhana spread (14.488) was found in the B_1C_1 combination, while the lowest percentage (14.247) was found in the B_2C_2 combination. At a 5% level of significance, the data was deemed to be non-significant

4-Lactose percentage

The highest lactose percentage of chhana spread (1.800) was identified in sample ($A_2B_1C_1$), while the lowest percentage (1.333) was observed in sample ($A_2B_2C_2$). As the optimal coagulant level grew, the lactose percentage of chhana spread increased. At a 5% level of significance, the results were non-significant. Due to varying levels of coagulant, the key difference (P0.05, CD=NS) in lactose percentage was found to be non-significant at the 5% level of significance. Lactose levels were highest in the $A_2B_1C_1$ sample, which had the highest chhana ratio.

Table No. 4(A): A×B×C combination value for lactose percentage.

Treatment	A_1		A_2		A_3	
	B_1	B_2	B_1	B_2	B_1	B_2
C_1	1.700	1.633	1.800	1.467	1.667	1.700
C_2	1.533	1.433	1.633	1.333	1.533	1.467
C.D.		NS				

Table No. 4(B): Average lactose content value of chhana spread as affected by different coagulants (A), there levels of coagulant (B) & storage periods (C).

Treatment	**B_1**	**B_2**	**C_1**	**C_2**	**Mean**
A_1	1.617	1.533	1.667	1.483	1.575
A_2	1.717	1.400	1.633	1.483	1.558
A_3	1.600	1.583	1.683	1.500	1.591
B_1			1.722	1.567	1.644
B_2			1.600	1.411	1.505
Mean	1.644	1.505	1.661	1.488	
C.D.	(A×B) 0.146		(A×C) NS		(B×C) NS

In terms of the varied amounts of coagulant, A_2B_1 sample had the highest lactose % (1.717), whereas A_2B_2 sample had the lowest lactose percentage (1.400). At a 5% threshold of significance, the outcomes differed significantly. The lactose percentage crucial difference (P0.05, CD=146) was found to be significant at the 5% level of significance. When CD values were examined further, it was discovered that AXB was much greater than the other groups, and that all of the groups differed from one another. Chemical activities have an inverse effect on the quality of chhana spread during storage.

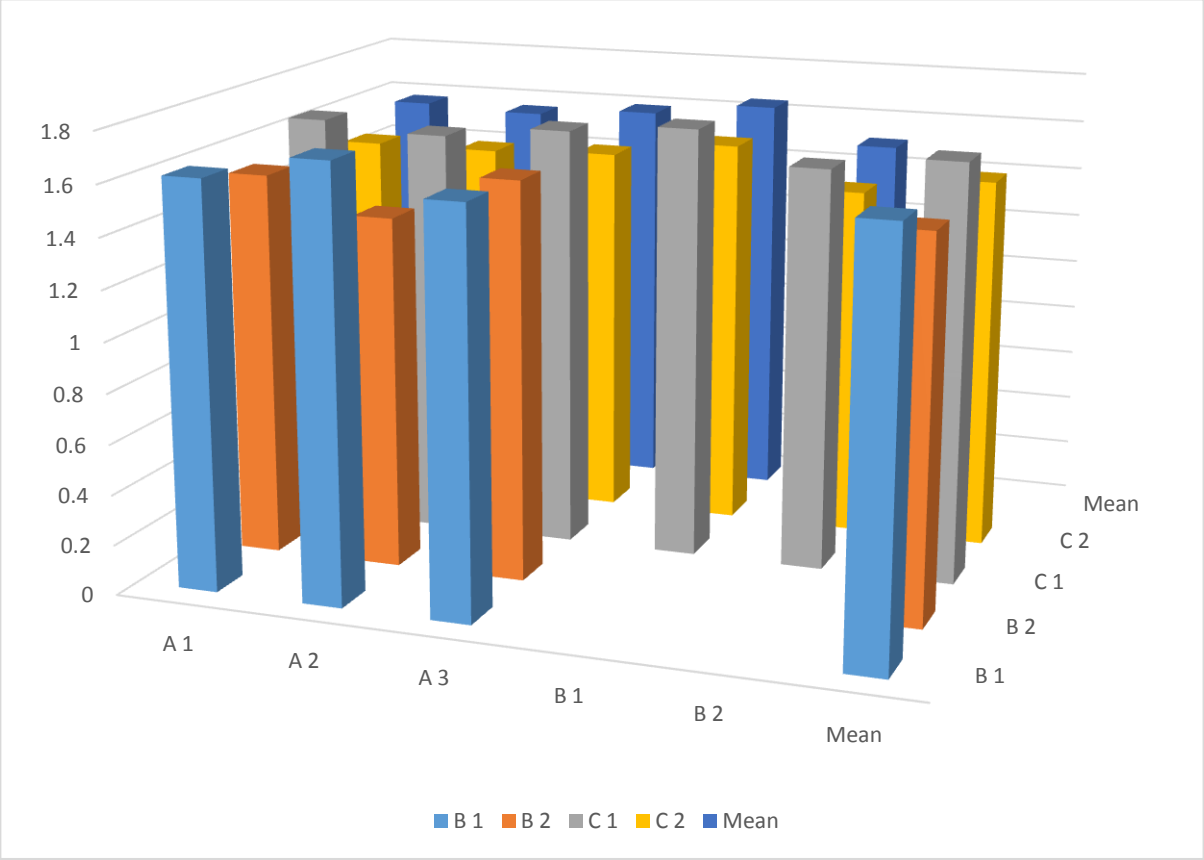

Fig. 4: Average Lactose content of chhana spread using herbal coagulants (A) as affected by different levels of coagulant (B) and storage periods (C).

5-Ash percentage

The highest ash percentage of chhana spread (1.800) was identified in sample ($A_2B_1C_2$), while the lowest percentage (1.257) was observed in sample ($A_1B_1C_2$). As the ideal coagulant level grew, the ash percentage of chhana spread increased. Due to varying quantities of coagulant, the key difference (P0.05, CD=NS) in ash percentage was found to be non-significant at the 5% level of significance. At a 1% level of significance, the outcomes differed significantly. The sample with the highest ratio of chhana ($A_2B_1C_2$) had the most ash.

Table No. 5(A): A×B×C combination value for ash percentage.

Treatment	A_1		A_2		A_3	
	B_1	B_2	B_1	B_2	B_1	B_2
C_1	1.300	1.500	1.667	1.600	1.567	1.600
C_2	1.257	1.700	1.800	1.733	1.800	1.733
C.D.		NS				

Table No. 5(B): Average ash content value of chhana spread as affected by different coagulants (A), there levels of coagulant (B) & storage periods (C).

Treatment	B_1	B_2	C_1	C_2	Mean
A_1	1.278	1.600	1.400	1.478	1.439
A_2	1.733	1.667	1.633	1.767	1.700
A_3	1.683	1.667	1.583	1.767	1.675
B_1			1.511	1.619	1.565
B_2			1.567	1.722	1.644
Mean	1.564	1.644	1.538	1.670	
C.D.	(A×B) 0.183		(A×C) NS		(B×C) NS

The influence of various B×C combinations on ash per cent was detected. The highest ash percentage of chhana spread (1.722) was found in the B_2C_2 combination, while the lowest percentage (1.511) was found in the B_1C_1 combination. At a 1% level of significance, the data was deemed to be significant. At a 5% level of significance, the essential difference in ash percentage (P0.05, CD=NS) was found to be non-significant.

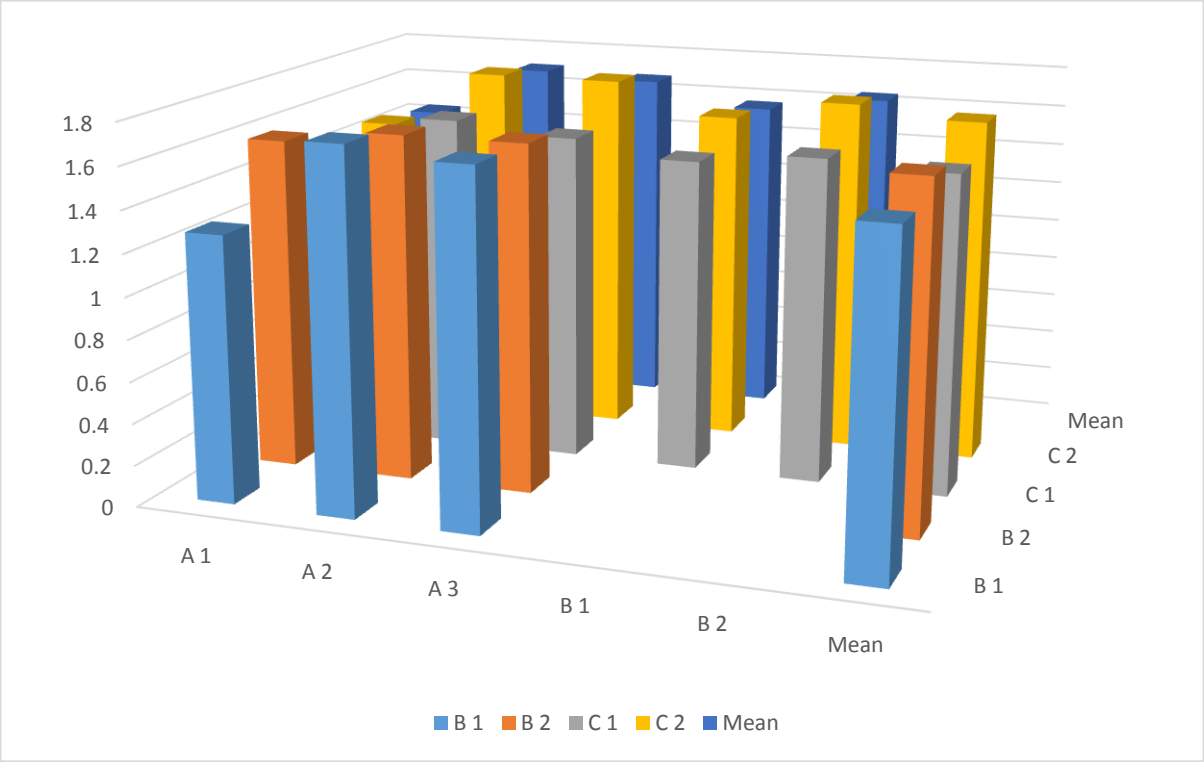

Fig. 5: Average Ash content of chhana spread using herbal coagulants (A) as affected by different levels of coagulant (B)and storage periods (C).

Conclusion

On the basis of a chemical analysis of chhana spread made with various degrees of coagulant, it was concluded that chhana spread made with an 80:20 ratio of water and coagulant was particularly popular on the fresh day. This mixture also has the highest per centage of chemical qualities, such as fat, protein, lactose, ash, with low moisture. The current analysis also shown that these chhana spread samples may be stored successfully for 10 days at 5 degrees Celsius without substantial deterioration.Following the experiment, it is possible to recommend employing an 80:20 ratio of water and coagulant in chhana spread to produce outstanding quality and improved nutrition.

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