

STUDY OF THE EFFECT OF STARTER CULTURES ON PRODUCT QUALITY AND THE RIPENING PROCESS IN CHEESE PRODUCTION

*S.N.Obloberdiyev¹, G.Sh.Korabekova², F.Sh.G'ulomova³,
M.J.Bekmurodova³, Sh.E.Ulashova³, Z.A.Madusmonova³*

*¹Acting Associate Professor, Tashkent Institute of Chemical Technology,
Yangiyer Branch, Yangiyer, Uzbekistan*

*²Master's student, Tashkent Institute of Chemical Technology,
Yangiyer Branch, Yangiyer, Uzbekistan*

*³Bachelor's student, Tashkent Institute of Chemical Technology,
Yangiyer Branch, Yangiyer, Uzbekistan*

Abstract. This article studies the effect of starter cultures on cheese quality and the ripening process. The study evaluated the influence of starter cultures on lactic acid formation, pH level, taste, aroma, consistency and storage stability. The results showed that starter culture activity is an important factor in the formation of cheese ripening rate, organoleptic properties and quality indicators.

Keywords: cheese, starter culture, lactic acid bacteria, ripening process, pH, taste, consistency, quality indicators.

Аннотация. В данной статье изучено влияние заквасочных культур на качество сыра и процесс его созревания. В исследовании оценивалось влияние заквасочных культур на образование молочной кислоты, уровень pH, вкус, запах, консистенцию и стабильность хранения. Результаты показали, что активность заквасочных культур является важным фактором формирования скорости созревания, органолептических свойств и показателей качества сыра.

Ключевые слова: сыр, заквасочная культура, молочнокислые бактерии, процесс созревания, pH, вкус, консистенция, показатели качества.

Annotatsiya. Ushbu maqolada pishloq ishlab chiqarishda starter kulturalarning mahsulot sifati va yetilish jarayoniga ta'siri o'rganildi. Tadqiqotda starter kulturalarning sut kislotasi hosil bo'lishi, pH darajasi, ta'm, hid, konsistensiya va saqlanish barqarorligiga ta'siri baholandi. Natijalar shuni ko'rsatdiki, starter kultura faolligi pishloqning yetilish tezligi, organoleptik xususiyatlari va sifat ko'rsatkichlarini shakllantirishda muhim omil hisoblanadi.

Kalit so'zlar: pishloq, starter kultura, sut kislotasi bakteriyalari, yetilish jarayoni, pH, ta'm, konsistensiya, sifat ko'rsatkichlari.

INTRODUCTION

Starter cultures are one of the important factors that determine product quality and the ripening process in cheese production. They convert lactose in milk into lactic acid

and affect the pH level, taste, aroma, consistency, and storage stability of cheese.

At present, one of the main problems is the uneven course of the cheese ripening process, which may lead to the appearance of a sour taste, irregular structure, or poor consistency in the final product. This is often associated with the incorrect selection of the type, amount, and activity of starter cultures.

Previous studies have investigated the role of starter cultures in lactic acid formation, protein breakdown, and the development of taste and aroma. However, evaluating their effect on cheese quality and the ripening process under local production conditions has practical importance.

The purpose of this study is to investigate the effect of starter cultures on product quality, pH changes, consistency, and the ripening process in cheese production.

The novelty of the study lies in the fact that the activity of starter cultures is evaluated in relation to the quality indicators of cheese based on a short technological analysis, and optimal application conditions are determined.

MATERIALS AND METHODS

A cheese sample prepared with the addition of starter culture was selected as the object of the study. Cow's milk was used as the main raw material, while lactic acid starter culture, coagulating enzyme, table salt, and drinking water were used as additional components.

The experimental process was carried out under laboratory conditions. First, the milk was filtered and pasteurized at 72–75 °C for 15–20 seconds. Then the milk was cooled to 32–35 °C, and starter culture and coagulating enzyme were added. The mixture was stirred slowly and left for coagulation for 35–40 minutes.

The obtained curd mass was cut into small pieces, the whey was separated, and the curd was briefly heated at 38–40 °C. Then the cheese mass was placed into molds, pressed, salted, and stored for ripening at 8–12 °C.

During the study, the pH value, acidity, moisture content, salt content, consistency, taste, aroma, and changes during the ripening process of the cheese samples were evaluated. A thermometer, pH meter or indicator paper, electronic balance, titration equipment, drying oven, laboratory glassware, molds, and a press device were used in the analysis process.

RESULTS

During the experiment, a decrease in pH, an increase in acidity, and the formation of consistency were observed in cheese samples prepared with starter culture. In the sample where the starter culture was used in the optimal amount, the taste, aroma, density, and ripening process of the product developed well.

Three experimental variants were compared:

In the experiment, three variants of cheese samples were compared. In **Variant 1**, a low amount of starter culture was added. In **Variant 2**, the starter culture was added

in the optimal amount. In **Variant 3**, a higher amount of starter culture was added.

Table 1

Effect of Starter Culture Amount on Cheese Quality

Indicators	Variant 1	Variant 2	Variant 3
Starter culture amount, %	0.5	1.0	1.5
pH value	5.6	5.2	4.9
Acidity, °T	65	78	92
Ripening duration, days	12	10	8
Moisture content, %	51.0	48.5	46.0
Consistency	Soft	Dense, elastic	Harder
Taste and aroma	Weak	Pleasant	More sour
Organoleptic score, points	3.6	4.8	4.0

According to the table results, Variant 2 showed the best result. In this sample, the pH was 5.2, acidity was 78 °T, and moisture content was 48.5%. The product had a dense and elastic consistency with a pleasant lactic acid taste.

In Variant 1, due to the low amount of starter culture, the taste and aroma of the cheese developed weakly, and its consistency was soft. In Variant 3, because of the excessive amount of starter culture, acidity increased, pH decreased, and the sour taste of the product became stronger.

In general, the amount of starter culture directly affected the ripening rate, elasticity, density, taste, and aroma formation of cheese. The use of starter culture in an optimal amount contributed to improving product quality.

DISCUSSION

The obtained results showed that starter culture directly affects cheese quality and the ripening process. In particular, in Variant 2, where the starter culture was used in the optimal amount, the pH decreased to 5.2, acidity reached 78 °T, and the product had a dense, elastic structure and pleasant taste.

In Variant 1, due to the low amount of starter culture, lactic acid formation was insufficient. As a result, the taste and aroma of the cheese were weak, and its consistency was soft. This indicates that the ripening process was slower.

In Variant 3, the addition of a higher amount of starter culture increased acidity and reduced the pH to 4.9. As a result, the product ripened faster, but the sour taste became stronger and the consistency became harder. This led to a decrease in the organoleptic score.

Lactic acid bacteria in the starter culture convert lactose into lactic acid and contribute to the formation of taste, aroma, and structure in cheese. The coagulating enzyme forms the cheese mass, while salt improves taste and increases the storage stability of the product.

Previous studies have also reported that starter cultures affect the pH level, acidity, ripening rate, and organoleptic properties of cheese. The results of this study confirm these findings.

The advantage of this study is that the effect of starter culture amount on product quality was evaluated under simple laboratory conditions. However, its limitation is that microbiological indicators and long-term storage processes were not studied in detail.

From a practical point of view, the use of 1.0% starter culture was considered optimal for producing high-quality cheese with a pleasant taste and stable characteristics. In future studies, it is advisable to investigate different types of starter cultures and their effect on shelf life.

CONCLUSION

The results of the study showed that starter cultures have a significant effect on cheese quality and the ripening process. Among the tested variants, Variant 2 with 1.0% starter culture gave the best result: the product had a dense and elastic consistency, as well as a pleasant taste and aroma. When the amount of starter culture was low, cheese ripening slowed down, while excessive starter culture increased acidity and strengthened the sour taste. The practical significance of the study is that high-quality and stable cheese can be obtained by using 1.0% starter culture. In future studies, it is recommended to investigate different types of starter cultures and their effect on shelf life in more detail.

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