

THE KASHRUT OF MICROBIAL ENZYMES

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This paper was approved by the CJLS on December 14, 1994, by a vote of sixteen in favor and three abstaining (16-0-3). Voting in favor: Rabbis Kassel Abelson, Ben Zion Bergman, Stanley Bramnick, Elliot N. Dorff, Samuel Frint, Jan Caryl Kaufman, Judah Kogen, Vernon H. Kurtz, Alan B. Lucas, Paul Plotkin, Avram Israel Reisner, Joel E. Rembaum, Joel Roth, Gerald Skolnik, Gordon Tucker, and Gerald Zelizer. Abstaining: Rabbis Jerome M. Epstein, Susan Grossman, and Aaron L. Mackler.

The Committee on Jewish Law and Standards of the Rabbinical Assembly provides guidance in matters of halakhah for the Conservative movement. The individual rabbi, however, is the authority for the interpretation and application of all matters of halakhah.

שאלה

Are cheeses made with microbial milk-clotting enzymes (sometimes referred to as rennin or rennet) kosher?

תשובה

Rabbi Isaac Klein, of blessed memory, in a responsum adopted unanimously by the CJLS on January 20, 1972, affirmed, "It is our considered opinion that cheeses, all cheeses, including those in which rennet, any rennet, is used as the curdling agent should be permitted." And he explains:

The rennet used today cannot be considered forbidden because, first of all, most of it is derived from dried up skins that have become like a piece of wood. In addition, the extraction is brought about by the use of strong chemicals and acids which removes the substance from the status of a food fit even for a dog. And third, the rennet goes through a number of chemical changes that transform it into a new substance. Finally, the rennet is not put into the milk in a pure form but is diluted with other substances so that it is בטל בשישים, annulled in sixty times its bulk.¹

¹ Isaac Klein, "Kashrut," in *Responsa and Halachic Studies* (New York: Ktav Publishing House, 1975), p. 57, and "The Kashrut of Cheese," *Conservative Judaism* 28 (winter 1972): 46.

The question is still relevant, however, for those among us who do not accept the conclusions of the Klein Teshuvah.

Enzymes In Cheese Making

Cheese is manufactured by adding a starter culture, which can consist of any of a number of different microbes depending on the type of cheese to be produced, to a vat of milk. At a specific pH designated by the cheesemaker clotting enzymes are added to the milk. The milk clots, forming curds and whey. The curds are separated from the whey and then blocked in a press to form the cheese which is aged until the desired flavors and texture result.²

Chymosin (also known as rennin), is one of several natural enzymes which coagulate milk. It is found in the stomachs of all ruminant animals. For centuries, extracts of ruminant stomachs containing chymosin have been used to clot milk for cheese manufacture. Calf rennet, extracted from the stomachs of calves has long been recognized as the premier source of the milk coagulant chymosin, and is widely used in the industrial manufacture of cheese. The supply of calf rennet is limited, and fluctuates in cost depending on the availability of calves. In the late 1800s research scientists began to try to standardize and supply reproducible sources of calf chymosin extracts. One major way, increasingly used in the cheese industry is the production of microbial rennin and the use of other milk-clotting enzymes.³

Microbial Rennin

Microbial rennin is an enzyme that is produced by a pure culture of microorganisms. Bacteria, molds and yeasts are single celled vegetative microorganisms. The appropriate microorganisms are isolated from the environment, or from calf chymosin, or may even be the product of genetic engineering. They are cultured by a process of fermentation in huge vats. The enzymes are harvested from the growing medium or broth by filtering the broth and isolating the enzyme from the filtrate by suitable purification treatment. All materials used in the process of production are food grade and are typically carbohydrates, such as glucose and starch, proteins from vegetable sources such as soy meal, and vitamin extracts, as well as inorganic phosphates and salts. The use of carbohydrates may present a problem for Passover use. However a number of kashrut certifying agencies are certifying cheeses made with microbial rennin for use during Passover.

The milk-clotting enzyme is concentrated, purified and standardized to uniform milk-clotting activity, specific gravity, pH and preservative levels. There are several stages in the process when chemicals are used in concentrations which would be harmful if the broth were eaten. Thus the broth would lose the status of food (נפסל מאכילת כלב), thereby solving possible kashrut and Passover problems. The final product is of high purity and less variable than the traditional extract from calf stomachs.

Microbial enzymes are competitive cost-wise with calf's rennet. A very significant portion of the cheese made in the United States is made with microbial rennin or other microbial milk-clotting enzymes.⁴ It should be noted that the term microbial rennet is not technically correct. The term microbial milk-clotting enzymes is the proper term.

² Z. Berk, *The Biochemistry of Foods*, p. 68.

³ Letter from Morris H. Katz. Mr. Katz has been extremely helpful in supplying information and in reviewing and correcting the technical details.

⁴ Letter from H. Heinson.

Microbial Enzymes Are The Product Of Vegetative Cells

Rabbi Klein, in his responsa on the kashrut of gelatin (1969) and the kashrut of cheese (1972), analyzes a number of principles that have wide application to the questions arising from modern methods of food production.⁵ These principles are amplified and applied in the responsum on mono- and diglycerides and in the responsum on the definition of a דבר שחדש.⁶ These papers are valuable in dealing with chemical changes, and the creation, from substances that may have been originally non-kosher, of food additives that are neutral.

However the essential principle used in the above papers, דבר חדש פנים חדשות, need not be utilized in the case of microbial rennin. The enzyme chymosin and other milk-clotting enzymes are not derived from animal sources. They are derived from microorganisms which are living vegetative cells, namely, yeasts, bacteria and molds and pose no problem in so far as the dietary laws are concerned. This also seems to be the conclusion reached by many of the kosher supervising agencies. *Kashrus Magazine*, in a brief report on biotechnology, states:

The FDA has recently published a formal ruling that products produced by biotechnology, i.e., by transferring a gene (a small amount of genetic material) from one organism to another, does not have to be labeled. Although the press and groups opposed to this policy have cited the concern of religious groups, it seems that most kosher supervising agencies are accepting these products as coming from the organism, i.e., the bacteria, yeast, or plant that actually makes the protein. For example, chymosin [rennet] from calves is now being made by bacteria and has received kosher acceptance as being a bacterial enzyme. We also believe that the kosher supervising agencies will accept porcine lipase (an enzyme from pigs) once it becomes available from a bacterial source.⁷

Conclusion

Pure microbial milk coagulating enzymes or so-called “microbial rennets” are kosher, and cheese manufactured with these products may be eaten. Those concerned about use during Passover may want to restrict themselves to cheeses that have Passover certification.

⁵ Isaac Klein, “Kashrut,” pp. 43-57, and “The Kashrut of Gelatin,” pp. 59-74, in *Responsa and Halachic Studies*.

⁶ Kassel Abelson, “The Kashrut of Mono- and Di-Glycerides,” *PCJLS 80-85*, pp. 181-185; Kassel Abelson and Mayer Rabinowitz, “Definition of a Davar Hadash,” *PCJLS 80-85*, pp. 187-90.

⁷ Dr. Joe and Carrie Regenstein, “Looking In,” *Kashrus Magazine* (Feb. 1993): 40. Both the Orthodox Union (O-U) and the “circle-K” supervise the manufacture of microbial milk-clotting enzymes.