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|  | **The Process of Making Cheese** by Yehuda Shain @ The Kosher Consumers Union There are so many varieties of cheeses, so we will start with basics and eventually cover more varieties from the soft ones through the hard and aged varieties. Cheese is made from the curds produced when milk is coagulated & is a fermented milk product. Microbes play an important role in determining the type of cheese that is made. When milk is coagulated it will separate into curds and whey. The curd is somewhat solid, and the whey is liquid. The main types of milk used to make cheese are from cows, sheep & goats. In Eretz Yisroel there is an abundance of Sheep and goat cheeses. The approximate percentages of fat are Cow= 3.8%, Goat= 6.0% and Sheep 9.0%. Milk is mostly water, approximately 88% , the remainder are mainly proteins, minerals, sugar (lactose), fat etc. There are two types of proteins in milk, casein & albumin. The casein helps in coagulating the milk. The albumin is in the whey. Whole milk sold in stores has approximately 4% fat, most of the fat will end up in the curd. It would go to say, "the higher the fat content, the softer the curd & the cheese texture". Skim milk is used to make the starter cultures & the lower fat cheeses, e.g. Romano, Parmesan & cottage. After the milk coagulates, the whey is removed & the curd is processed into cheese. The cheese contains almost all of the vitamins, minerals & nutrients of the milk. It would take approximately 10 pounds of milk to make one pound of cheese. NOTE: the whey is used also for butter, the issue is by non-cholov Yisroel butter which some people that are using cholov Yisroel milk & cheese yet, use non-cholov Yisroel butter as brought in certain Seforim. Now that they also use the whey from cheese, it must be gevinas Yisroel, which it usually is not.There is serious recent concerns re: non-cholov Yisroel re: the veterinarian procedures-we addressed that issue in a previous podcast. Cheesemaking is divided into two parts, the manufacturing process & the ripening or aging process. Manufacturing is essentially the first 24 hours, from pasteurization to salting. Pasteurization is treating the milk with heat for a short period of time to destroy some of the bacteria that are harmful to humans. Many bacteria and bacteria spores will still remain in the milk after pasteurization. It is these bacteria that will cause milk to sour. Bacteria is also used to acidify the milk. There is a natural bacteria in milk.The reason to raise the acid level of the milk is to lower the pH of the milk. The amount of acid has a direct effect on the coagulation, curd strength among other effects on the cheese process. Too much acid will cause the cheese to be crumbly, low acid will cause the cheese to have a pasty consistency. So, you have to play around till you get the desired consistency. Bacteria feed on the lactose in the milk and produce lactic acid. As time goes, the lactic acid increases thereby achieving a lower pH in the milk. Lemon juice or vinegar can also be used instead of the bacteria.Dehydration is the removal of the water. As the pH is lowered, the structural nature of the proteins also change. The casein proteins that form the curds entraps water and fat. There are three methods used to cause milk to coagulate 1) by the addition of enzymes (rennet etc.), 2) acidification to a pH of 4.6 without heat, 3) acidification to a pH of 5.2 with heating. The most common method being used for coagulation is by the addition of enzymes. The physical properties of enzyme coagulated cheese are superior to the acid coagulated cheese. The enzymes used to coagulate milk may come from a number of sources: animals, plants & fungi. The most common source was rennet. Rennet is made from the lining of the fourth stomach of calves.The most common enzyme used to coagulate milk is rennet. The calves are milk fed and are usually less than 10 days old. Young calves are used because they stop making chymosin as they get older. The most important enzyme in rennet is chymosin. Rennet would therefore be a problem for the kosher consumer. Rennin is the name given to the enzyme fraction of rennet.Until recently the only source of rennin was calves. Science has created a system for the enzyme chymosin that does not require calves. Using genetic engineering, the gene for chymosin was cut from a calf cell and they were able to produce an exact microbe copy of the calf chymosin. Microbes replicate and grow rapidly, thus a supply of rennin is available.**STARTER CULTURES**: Cheese making also requires starter cultures. The natural culture in milk is destroyed by the heat treatments given to milk, are uncontrollable & unpredictable. With starter cultures you can control the flavor, aroma, inhibit undesirable organisms etc. There are single strain cultures and mixed or compound cultures. In the compound cultures, each strain will provide its own specific characteristics. The commercial manufactures of starter cultures will make them in different forms. They will make them frozen, freeze-dried or spray dried. There are a number of steps necessary for preparing starter culture ready for cheese production. There is a mother culture-first inoculation (all cultures will originate from this mother culture). The Cholov Yisroel processors do a 3-time procedure to alleviate the cholov akum issue, but it does not alleviate any of the other possible issues. **ADDITIVES**: The following may all be added to the milk cheese process: Calcium, nitrates, color, hydrogen peroxide & lipases. Calcium is added to replace the calcium lost during pasteurization. The calcium also reduces the amount of rennin required. The nitrates control some undesirable effects in cheeses such as the Swiss & Edam cheeses. Lipases are normally present in raw milk but are inactivated during pasteurization. Lipases may be added to ensure proper flavor development.**CHEESE RIPENING**: Except for fresh cheese, the curd is ripened for various times at various temperatures. The process of ripening will continue till the cheese develops its characteristic flavor, texture etc. During ripening there are ripening agents used. Ripening agents used in cheese making are: Rennet, lipases, molds/yeasts, bacteria, and enzymes. Temperature and humidity will have an effect on the final end product. Ripening or aging of cheese may be just days, weeks, months or even years. Cheeses that are aged 6 months or more are of the type of cheeses that require the 6-hour waiting time between eating cheese and eating meat. The author can be reached at kashrusy@aol.com. |