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BIOACTIVE GOUDA CHEESE POWDERS OBTAINED BY SPRAY AND FREEZE-DRYING

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ABSTRACT The growth in the ready-to-eat meals sector in recent years had been reflected in the increase in the demand for cheese as a food ingredient. Today, cheese powders find widespread use in a variety of foods, including biscuits and other bakery products, sauces, snack coatings, soups, pasta, cheese dips, etc. On the other hand, consumers are nowadays not only looking into the traditional sensory and visual characteristics of cheese, but also to its nutritional value. Proteins, fats and minerals are common nutrients found in cheese. Among cheese nutrients, vitamins such as A, B, and D as well as conjugated linoleic acid (CLA) are presently of great interest due to their nutraceutical properties. Many of these nutritional attributes can, however, be lost or degraded by oxidation during transformations operated at severe operation conditions, such as is the case of spray drying process, which by economical reasons still remains the common industrial method for this application. The main goal of the present proposal is thus the study of drying methods to produce cheese powders with high bioactive activity. An emulsion will be made by first grinding Gouda cheese and then mixing it with hot distilled water in different proportions (TS 30-40%). Emulsifying salts will be added. The resulting slurry will be dried by spray drying and freeze-drying at different operating conditions. For spray drying, emulsions will be heated up to at least 50°C to low its viscosity in order to ease its flow through the spray dryer (Niro Atomizer Ltd, Copenhagen, Denmark). Inlet air temperature will be 160-180°C and the exit air temperature, 60 to 90°C. In the case of freeze-drying, emulsions will be poured in 1-cm thickness trays and frozen at -40°C in medical freezer. Then, they will be freeze-dried in a Virtis Unitop 400 L (Gardinier, 12525, New York, USA) connected to a low-temperature (- 90°C) condenser Freeze mobile 25EL (Virtis New York, USA). The process will be carried out at heating plate temperatures in the range from 15 to 50°C during 8-36 hours under a vacuum of less than 3 mTorr. Moisture content and temperature of the products will be recorded as a function of time. Before and after the drying processes, the cheese samples will be tested for nutritional aspects (moisture, Calcium, Phosphorous and CLA contents) as well as oxidation indexes (peroxide and p-anysidine values). Cheese powders will be characterized by their organoleptic attributes (color, aroma, microscopic structure), thermal stability (glass transition temperature) and physical properties (bulk density, dispersibility, flowability and meltability). The results

showed that the conservation of nutritional attributes in cheese depends on inlet temperature during spray drying. Cheese powders obtained by freeze-drying had a better overall bioactive quality.

Keywords: Cheese powder, freeze-drying, spray-drying