SYSTEMS FOR DELIVERY OF VITAMIN D (СИСТЕМИ ДОСТАВКИ ВІТАМІНУ D)

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The fortification of food with vitamin D has several limitations because this group of fat-soluble compounds may degrade or undergo undesirable changes during technologic processing and storage of food. The purpose of this study was to investigate emulsions for vitamin delivery in commercial foods. Oil-in-water (o/w) emulsions stabilized by mixture of various proteins (whey protein isolate (WPI), skimmed milk powder (SMP) and vegan protein isolate (VPI)) as emulsifiers and carboxymethylcellulose as thickening agent were used. The shear stress and effective dynamic viscosity of the emulsions in the wide range of shear rates were experimentally determined. By approximating experimental flow curves using the power-law model, the values of the consistency coefficient and flow behavior index were obtained, which made it possible to classify the emulsions as systems with pseudoplastic flow. Within the framework of the structural approach, the rheological data were analyzed on the basis of the generalized rheological model of Casson. The contributions to the process of viscous flow calculated from the experimental data from the integral characteristics of associates of droplets and individual particles during their hydrodynamic interaction made it possible to explain the effect of changing the viscosity of emulsions from the nature of the emulsifier used. The zeta potential values determined by the dynamic light scattering method indicate the existence of a strong repulsive force as a factor for the stability of emulsions. The sign of the potential and its magnitude indicate the process of adsorption on the surface of fat droplets molecule of protein. The presence of a peak of flocculated particles in the histograms of the particle size distribution is explained by the presence of non-adsorbing polysaccharides, which are capable of the generation of aggregated emulsion structures through depletion flocculation. Regardless of the choice of the type and nature of the protein emulsifier - animal or plant origin, all studied systems were stable and can be considered for use as emulsion-based delivery systems of vitamin D. From an economic point of view, it is advisable to use dry milk as an emulsifier. The resulting emulsions can be used as a basis for the production of vitamin D3-fortified foods, in particular for dairy products.