Cheese analogues have garnered significant interest due to the growing shift toward plant-based diets. While most meltable cheese analogues currently on the market are low in protein, this study explores a tricomponent meltable gel as a model for high-protein cheese analogues. A canola protein isolate (CPI) was prepared with a protein content of 90.16% by use of ultrafiltration/diafiltration, following an alkaline extraction conducted at pH 9.0. It was shown that the CPI include a majority of albumin and globulin, with maintained nativity and the isoelectric point located at ~pH 6.0. The cheese analogues formulated using canola proteins, waxy corn starch, and coconut oil were characterized in terms of the meltability, rheological properties, thermal properties, and the interactions involved in the gel structure. The investigation of heating conditions revealed that increasing the pH from 5.0 to 7.0 and heating temperatures from 75°C to 95°C led to a decrease in meltability, while simultaneously enhancing gel strength. Hydrogen bonding was majorly responsible for the formation of the gel network, whereas disulfide bonds were the secondary stabilizing interactions, with very limited hydrophobic interactions. Dynamic Scanning Calorimetry revealed a broadened oil peak in cheese analogues and a refolded protein structure occurred after the heating process. Formulation analysis indicated that increased oil content and decreased starch content reduce meltability while enhancing gel strength. This study provided a deeper understanding of formulating high-protein cheese analogues by examining the heating condition and the role of each component in developing a meltable gel structure.