A numerical 3D model of coupled transport phenomena and texture changes during the roasting of chicken breast meat in a convection oven was developed. The model is based on heat and mass transfer coupled with the kinetics of temperature induced texture changes of chicken breast meat. The partial differential equations of heat and mass transfer as well as the ordinary differential equations that describe the kinetics of the texture changes were solved using COMSOL Multiphysics® 5.2a. The predicted temperature, moisture and texture (hardness, chewiness and gumminess) profiles were validated using experimentally values. The developed model enables the prediction of the texture development inside the chicken meat as function of the process parameters. The model predictions and measured values show the clear effect of changing process settings on the texture profiles during the roasting process. Overall, the developed model provides deep insights into the local and spatial texture changes of chicken breast meat during the roasting process that cannot be gained by experimentation alone.