We ascertained the mechanism of heat transfer in the surface layers of beef with a high content of connective tissue in the second stage of the process of bilateral frying under compression conditions. We offered the method of calculation of heat transfer coefficient through steam layers. Using the sound experiment we determined duration of the cycles of evaporation in the menisci of capillaries of different diameters, which amounts from $50 \cdot 10^{-6}$ to $333,3 \cdot 10^{-6}$ s. We detected the distribution of capillaries due to diameters in the surface layer of meat, which amount from $24 \cdot 10^{-6}$ to $160 \cdot 10^{-6}$ m. Actual heat transfer coefficient from one or two frying surfaces to the processed product has been calculated. We ascertained the dependence of heat transfer coefficient from the specific surface power of frying surfaces. We theoretically calculated duration of the process, which fully coincides with the real duration of the frying process.

**Keywords:** frying, heat transfer, steam layers, meat.