

Ministry of Education and Science of Ukraine

National University of Food Technologies

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**Anniversary International  
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**"Youth scientific achievements  
to the 21st century nutrition  
problem solution"**

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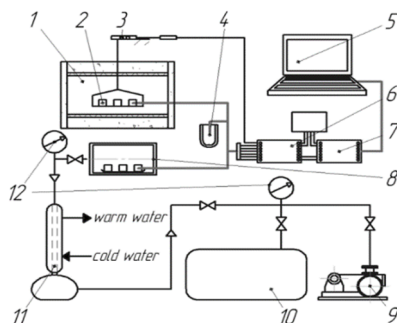
## 22. Research of vacuum cooling of bread

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**Introduction.** Cooling of hot bread after baking before cutting and packaging is relevant for the baking industry. The traditional way of cooling and storing bread on trolleys (containers) involves the use of manual labor. Equipment which is used in bakeries to cool bread is massive, and the process is long.

**Materials and methods.** The application of the vacuum bread cooling method is expanding, and this method makes it possible to reduce the cooling time, reduce the cost of equipment and production space. To study the processes of cooling the bread under vacuum, we have created an experimental installation (fig.1), which includes: 1 oven, 2 dough workpiece, 3 strain gauge scales, 4 dewar dish with thermocouples, 5 computer, 6 analog module, 7 data conversion module, 8 vacuum evaporative cooler, 9 vacuum pump, 10 receiver, 11 capacitor, 12 manometer.

**Results.** The obtained temperature curves of bread-dough and its following cooling in vacuum and storage conditions indicate a significant reduction in the cooling process of bread in vacuum conditions compared with traditional ones. It was found, that from 98 ° C to 30 ° C 6-5,5% of moisture evaporates from the weight of the billet during vacuum cooling, while cooling in a storage facility, the amount of evaporated moisture is 2.5 - 5%.



**Fig. 1. Experimental vacuum evaporator installation**

**Conclusions.** Slight moisture losses in vacuum cooled billets can be compensated with shortening of baking time, and such benefits as reducing the process length, reducing energy consumption costs for cooling products, and improving their qualitative indicators, which testifies about prospects of vacuum cooled bread.

**References.** О.С. Кобець, М.Г.Десик, О.В. Арпуль, В.Ф. Доценко, В.І. Теличкун (2016), Використання вакуумного охолодження у технології бісквітних напівфабрикатів, Наукові праці НУХТ, 22(6), с. 173-178