SECTION II.
ENGINEERING AND IT

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DETERMINATION OF CHICKEN WHITE AND RED MEAT MIXTURE GRINDING PROCESS OPTIMAL CONDITIONS TO INCREASE MEAT WATER FIXING ABILITY

Nataliia Stukalska
Ph.d. (Engineering), Associate professor of the
Department of technology of restaurant and ayurvedic products
National University of Food Technologies

Iryna Sylka
Ph.d. (Engineering), Associate professor of the
Department of technology of restaurant and ayurvedic products
National University of Food Technologies

UKRAINE

Purpose of this study is to determine regressive dependence of water fixing ability of chicken white and red meat mixture (filet + leg) upon process conditions, which may be used for verification of effect of grinding process parameters and prediction of water fixing ability increase due to certain process parameters.

During research it has been used Box-Wilson method active experiment plan, which permits to save labor cost of research.

Water fixing ability is determined by compaction method

To improve grinding process of chicken meat raw material (filet+leg) to increase water fixing ability we need to compare different variants of process, consider and present conclusions about effect of a number of factors at this parameter. The varying parameters have been selected as follows: N (x_1) – shaft speed, rev/min; d (x_2) – mesh size, $m \cdot 10^{-3}$; F(x_3) – raw material feed force, H; α (x_4) – blade angle, deg.

During experiment we used BRAUN meat grinder with mesh size 3 and 6 $m \cdot 10^{-3}$, straight and curved blades, Lenze frequency converter, which controls main drive shaft speed, potentiometer for power measurement.

Half-replicated four-way experiment (2^{4-1}) with defining contrast $x_4=x_1x_2x_3$ has been implemented. That's why 8 trials with double replication, which have been randomized by random numbers, have been performed.

Statistical processing of the results of the experiment was performed according to the method of Adler Yu.P., which allowed to obtain a regression function, which adequately describes the influence of the grinding process conditions to increase the moisture-binding capacity of minced meat from a mixture of white and red chicken meat (fillet+shin) in the ratio 1:1,% and is suitable for forecasting and control.

After calculation of factor interaction regression coefficients equation is as follows:

$$y = 65.47 + 0.72x_1 + 0.11x_2 - 0.08x_3 + 1.07x_4 - 0.85x_1x_3 + 0.03x_1x_4 - 1.05x_3x_4 \quad (1)$$

Equation *(1)* is not suitable for practical calculations. Thus using transfer equations from code to natural values of factors (N, d, F, α), expressions of code factors via their natural values were defined:

$$x_1 = \frac{N-110}{40};\ x_2 = \frac{d-4.5}{1.5};\ x_3 = \frac{F-1}{0.5};\ x_4 = \frac{\alpha-60}{30}; \quad (2)$$

After mathematical transformation of equation *(2)* an equation, which describes dependence of 1:1 chicken white and red mince-meet water fixing ability upon grinding conditions, has been received:

$$WFA = 52.41453 + 0.5939N + 0.07208d + 8.75094F + 010335\alpha - 0.04266NF + 0.00002N\alpha - 0.07021F\alpha \quad (3)$$

Thus, regression functions in code and natural values of varying factors, which adequately describe their effect on optimization parameter, has been received.

On the basis of preformed researches it has been proposed rational conditions of 1:1 white and red chicken mince-meat (fillet+thigh) grinding process: main drive shaft speed - 150 rev/min; mesh size - $6 \cdot 10^{-3}$ m; raw material feeding force - 15 N; blade angle - 90^{0}.