

Investigation the process of drying and ageing of raw-dried meat products from chopped meat, in a pulsating hydrodynamic regime of the drying agent

G. KARTELOV, K. VASSILEV

Higher Institute of Food and Flavour Industries, 26 "Maritza" boul. 4002 Plovdiv, Bulgaria

SUMMARY : The internal hydrodynamics in the climatic chamber is done by means of a cyclic capacity change of the fed drying agent, in its cross-section, by means of pressure air-pipes. By means of a reversing valve, through a set period of time, the percent distribution of the air stream is changed (a drying agent) which on its turn leads to speed change between the sausages in the climatic chambers cross-section. The hydrodynamic regime in the internal capacity of the climatic chamber, organized so far is the basic prerequisite for mass-exchange processes intensification, shortening of the technological cycle and improvement the quality of the production. The object of investigation are the processes of drying and ageing of raw-dried meat products from chopped meats, at a set heat-humidity, cyclicly changing pulsating hydrodynamic mode of the drying agent (climate conditioned air). The results of the experimental investigations in drying and ageing of meat products from chopped meat in a cyclicly changing pulsating hydrodynamic regime of feeding in the internal capacity of the climatic chamber of a drying agent have been exposed.

INTRODUCTION : At present, the drying agent circulation (the air streams with the set heat-humidity parametres - conditioned air) in the cross-section of the climatic chambers is done by means of ceiling and floor positioned air-pipes. At that condition it is impossible to position uniformly the rack carts upon the floor, which on its turn disturbs the uniform drying agent circulation in the climatic chambers cross-section. The uniform circulation of the drying agent on its turn is a prerequisite for the formation of a moisture-proof slayer (ring) in a given lot, damp-drying of another. /Corattik, 1974; Karpati, 1963/. The damp-proof ring makes more difficult the process of moisture diffusion from the inner side to the surface of sausages and leads to disturbing the optimum flowing of the technological processes - drying and ageing, i.e., it cannot be quarranteed and achieves the necessary production quality in the whole capacity of the climatic chamber /Totter L.; 1973; Terplan G.; 1973/.

The purpose of the present work is to create such a distribution of the drying agent in the climatic chamber, by means of which the moisture diffusion outside should equilibrium in the whole production capacity, in that way avoiding the formation of a damp-proof ring around its outer surface and conditions are created for intensification the process of drying. By means of the proposed decision for drying agent distribution in the climatic chamber, a comparatively speedy field in sausages height is quarranteed in the given cross-section of the chamber.

MATERIALS AND METHODS : The system for ensuring the inner hydrodynamics in the climatic chamber is achieved by means of pressure and suction air-pipes, positioned on the ceiling.

The pulsating streams of the drying agent, fed in the climatic chamber capacity, are in a

ratio 80 % to 20 %. The pulsating streams of the drying agent fed in the cross-section of the climatic chamber are realized from a main air-pipe with a valve, positioned on the ceiling pressure air-pipes, with pressure nozzles, mounted on them, the schematic diagram of which is shown on Fig. 1.

The homogenous but having a different speed streams of the drying agent, periodically changing in the climatic chamber cross-section, in the process of drying and ageing, ensure the moisture remove from the production to take place in the following two stages :

First Stage - in stream high speed (80 %) of sausages, a remove of the surface moisture takes place. The schematic diagram of the moisture removing mechanism from the sausages surface is shown on Fig. 2.

Second stage - in low stream speed (20 %) of sausages, the s.c. "rest" a moisture diffusion from the inside to the surface is done. The schematic diagram of the moisture diffusion mechanism to the sausages surface is presented on Fig. 3.

In that way the drying agent feeding is periodically changed, by definite heat-moisture parameters in the climatic chamber inner capacity, in the process of drying and ageing of raw-dried meat products (sausages). In such a drying agent feeding into the climatic chamber, the formation of a surface damp-proof ring formation is avoided.

Into an experimental climatic chamber a pulsating hydrodynamic drying agent mode is organized in the inner capacity, and some investigations have been carried out to raw-dried meat products, made from chopped meat, characteristic for our country.

The investigations have been carried out by using some typical of our country pressed and non-pressed raw-dried sausages, namely "lukanka" (a kind of a flat sausage), of the type "panagjurska" and "Tarnovska" and salami, of the "Hemus" type.

The meat raw materials processing to the moment of placing the sausages into the drying ageing chamber, is done by using the established technology for the production of this type of meat products. The changes in the samples mass have been determined by weighing every day a definite number of pieces from each lot set for investigation. we did a periodic control of the water content, too, by means of drying the samples until reaching a permanent weight in order to determine the end of the moment of drying for each lot.

RESULTS AND DISCUSSIONS : For "lukanka" "Panagjurska" the values for changing the mass and water content in the process of drying and ageing in a pulsating hydrodynamic drying agent mode with heat-moisture parameters - temperature from + 10°C to + 15 °C and relative humidity 75 % + 85 % are presented on Table 1.

Days for drying and ageing	Samples mass change in grams				
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1	2	3	4	5	6
First day	810	840	870	890	880
Second day	755	790	825	840	830
Third day	710	745	780	795	780
Fourth day	650	680	715	725	715
Seventh day	590	620	645	655	650

The mass and water content values in the process of drying and ageing of "lukanka", of the type "Tarnovska" in a pulsating hydrodynamic mode of the drying agent

1	2	3	4	5	6
Eighth day	580	610	640	650	640
Ninth day	560	590	615	625	620
Tenth day	550	580	605	615	610
Eleventh day	540	570	600	610	605
Fourteenth day	515	540	565	575	570
Fifteenth day	510	530	560	565	560
Sixteenth day	500	525	550	555	550
Seventeenth day	495	520	540	550	545
Eighteenth day	485	510	535	540	540
Nineteenth day	470	490	520	525	520
Twentieth day	465	485	510	520	515
Twenty first day	460	480	505	515	510
Mean mass loss for each sample	350	360	375	375	370
Water content from average sample on the 24-th day			28 %		

Table 2.

1	2	3	4	5	6
First day	840	875	825	820	830
Second day	785	820	780	775	780
Third day	735	775	735	735	730
Fourth day	665	700	665	665	665
Seventh day	590	620	580	585	590
Eighth day	580	610	575	580	585
Ninth day	560	585	550	555	560
Tenth day	550	570	540	540	550
Eleventh day	545	565	530	535	540
Fourteenth day	500	530	495	500	505

1	2	3	4	5	6
Fifteenth day	495	520	485	490	500
Sixteenth day	485	510	475	480	490
Seventeenth day	475	500	465	470	480
Eighteenth day	470	490	460	465	475
Nineteenth day	450	470	440	450	455
Twentieth day	440	465	430	440	450
Twenty first day	440	460	430	435	445
Mean mass loss for each sample	400	415	415	385	385
Water content of each sample on the 24-th day			33 %		

TABLE 3.

1	2	3	4	5	6
First day	915	880	870	865	875
Second day	870	845	830	820	830
Third day	830	805	795	785	785
Fourth day	755	735	725	720	720
Seventh day	675	655	640	640	650
Eighth day	650	630	620	620	630
Ninth day	635	610	605	605	610
Tenth day	625	605	595	595	600
Eleventh day	610	590	580	580	590
Fourteenth day	590	565	555	555	560
Fifteenth day	585	560	550	550	555
Sixteenth day	570	550	540	540	545
Seventeenth day	560	540	535	535	540
Eighteenth day	555	535	525	530	535
Nineteenth day	535	515	510	510	515
Twentieth day	530	510	500	500	505
Twenty first day	520	500	500	500	500
Mean mass loss from each sample	395	380	370	365	375
Water content of each sample on the 24-th day			35 %		

with the heat-moisture parameters - temperature + 10 + 15°C and relative humidity 75 - 85% are presented in Table 2.

For salami of the "hemus" type, the mass and water content change values in the process of drying and ageing in a pulsating hydrodynamic mode of the drying agent, with heat-moisture parameters of the medium 10 - 15 °C and a relative humidity 75 - 85 % are presented on Table 3.

CONCLUSION : On the basis

of the results obtained from the hydrodynamic mode and pulsating mode of the drying agent utilization in the production of raw-dried sausages, we can draw the following conclusion :

1. The process of drying is intensified, in the investigated by us sample having obtained a finished product in the course of 24 days.
2. The formation of a surface damp-proof ring has not been determined.
3. The applied pulsating hydrodynamic mode of the drying agent is a prerequisite for improvement the quality of the finished product.

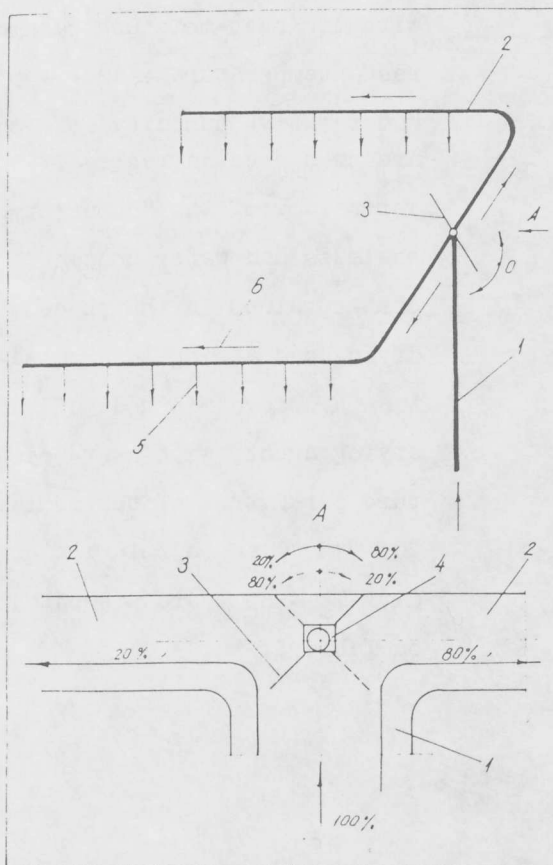


FIG. 1.

Schematic Diagram of the Pressure Air Pipe with the Regulating Valve :

- 1 - main air pipe ;
- 2 - pressure air-pipe ; left and right ;
- 3 - valve ;
- 4 - servomotor ;
- 5 - 6 - directions of the fed drying agent ;

FIG. 1

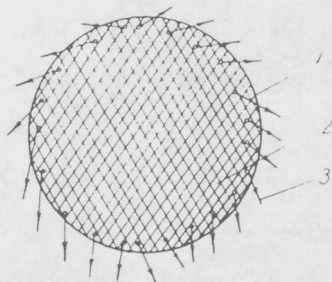


FIG. 2

Mechanism for surface moisture from the product cross-section :

- 1 - surface layer ; 2 - core ;
- 3 - surface moisture ;

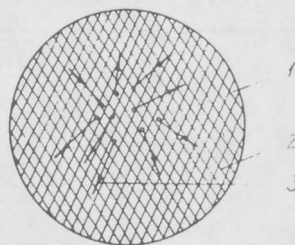


FIG. 3

Mechanism of moisture diffusion to the surface :

- 1 - surface layer ; 2 - core ;
- 3 - moisture diffusion to the surface ;

BIBLIOGRAPHY :

1. Coretti K. (1974), Die Fleischwirtschaft, 2, 170-176.
2. Karpati G. (1963), Der Fleischermeister, 9, 233-235.
3. Kotter L. und Prändl O. (1968), Die Fleischwirtschaft, 10, 26-28.
4. Terplan G. (1973), Die Fleischerei, 6, 54-57.