

STARTER CULTURES MF 42–K IN THE PREPARATION OF RAW DRIED SAUSAGES

Ili V.

Technical University of Moldova

V. Ili, e-mail: vasile.ili@condiviv.com

Summary: This study investigates the action of starter culture MF 42–R on the characteristics modifications (pH, a_w , W, ΔG) of the raw fermented sausages mixture during the flow sheet.

The obtained results allow provisional programming of the possible modifications according to the dosage of the starter cultures and sugar used at mixture preparation, assures the microbiological stability and period of flow sheet.

Key words: starter cultures MF 42–R, raw fermented sausages, a_w , maturation–drying, fermentation phase.

Introduction

Nowadays, in Moldavian meat industry, as well as in other countries, are applied different imported Starter cultures at raw fermented sausage preparation [1,2].

Starter cultures MF 42–R produced by the company „Biovitec”, France – are a mixed culture formed from *Staphylococcus carnosus* – 25%, *Staphylococcus xylosus* – 25%, *Lactococcus sake* – 25%, *Lactobacillus curvatus* – 25%. The microbiological characteristics are presented bellow, table 1 [3].

Table 1. The microbiological characteristics of Starter Cultures MF 42–R

Name	Admitted limits
Lactic bacteria	$300 \cdot 10^9$ ufc/plic
Micrococcus	$300 \cdot 10^9$ ufc/plic
Contaminated moulds	< 10g
Enterobacteriaceae	<10g
Bacteria ASR	absent in 1 g
Coag+staphylococci	absent in 1 g
Monocitogene Listeria	absent in 25 g
Salmonella	absent in 25 g

Starter culture MF 42–R accelerates the fermentation process, it is recommended for all types of fermented sausages, with or without membrane.

MF 42–R is characterized by a double activity of the bacterial mixes: quick acidification, that allows an accelerated forming of the sausages secondary structure and a pleasant lactic aroma; an enzymatic activity that assures a pleasant and constant coloration accompanied by a specific taste.

The study goal is to investigate the modification of the characteristics (pH, a_w , W, ΔG) of the raw fermented sausages mixture during the operations of fermentation and maturation–drying.

Materials and methods

For raw-fermented sausage preparation have been used unfat pork meat, frozen and refrigerated -70% ; frozen pork backfat -30% . Auxiliary materials –salt, mix of fibres "Bestfibre 110", complex mix "Milano 3", sugar, dextrose, complex mix "Milano 2", whole black pepper, nitrite and nitrate mix „Conservante 25", milled chilli, starter culture MF-42R, colagenic membrane $\varnothing 40\text{mm}$.

Fermentation process, maturation, drying have been realized in climatic chamber Fiulinox AS EN2. Have been determined the following indexes: pH, W, ΔG , a_w [4,5]. Starter culture MF 42-R is added in the raw material at the beginning of the process.

There are two methods: sprinkle of the whole packet with starter culture MF 42-R directly on the surface of the raw material in cutter tank or rehydration of the product in 100 ml cold water. The second method have been used. In that case, the solution is used during 4 hours from the preparation. The solution is poured directly on the surface of the raw material in cutter tank.

Results and Discussion

The technology of sausage preparation have included basically technological operations: carving, deboning, meat selection, cooling treatment, wolf grinding, drain, hardening, composition preparation, filling in guts, thermal treatment.

Thermal treatment regime includes the compaction during 6–12h, fermentation and drying in two phases. The temperature at the beginning of the fermentation process have been $22 \pm 1^\circ\text{C}$ and $\varphi=85-90\%$, during the drying temperature range from $18-13^\circ\text{C}$ and $\varphi=80-78\%$.

In order to investigate the influence of the optimal starter culture dose have been tested 7 probes of raw-fermented sausage, from which the first probe was without witness culture, probe 2 was with 7 g culture per 100kg raw material, probe 3 –14g per 100kg and probe 4 with 20g of culture. The dextrose concentration was 700g per 100kg of raw material.

In figure 1 and 2 are represented pH evolution and the losses of weight that occur during the process of maturation-drying.

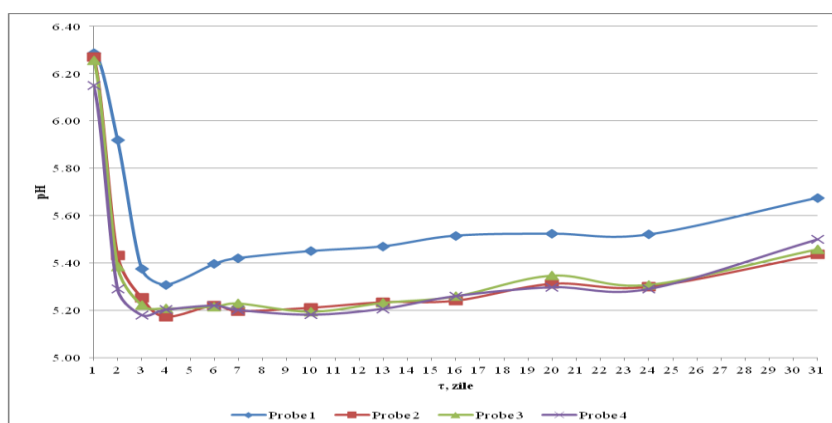


Fig. 1 pH evolution during sausage maturation-drying

According to the graphic presentation we can remark the pH decline in the first 3–4 days of fabrication process, followed by a slow growth till the final levels 5,4–5,5 for sausages with starter culture and 5,7 for witness probe.

We can notice that the raw-fermented sausage with starter culture Mf 42-R is more acidified than the sausage without starter culture, reaching in the fase of fermentation the value 5,2 that assures the stability from a microbiological point of view. The pH variation between probe 2,3 and 4 where not significant, even if probe 4 has attended minimum pH value –5,18 quicker, in the 3rd day comparative with day 4 for probes 2 and 3. So, higher content of culture, quicker acidification during maturation phase.

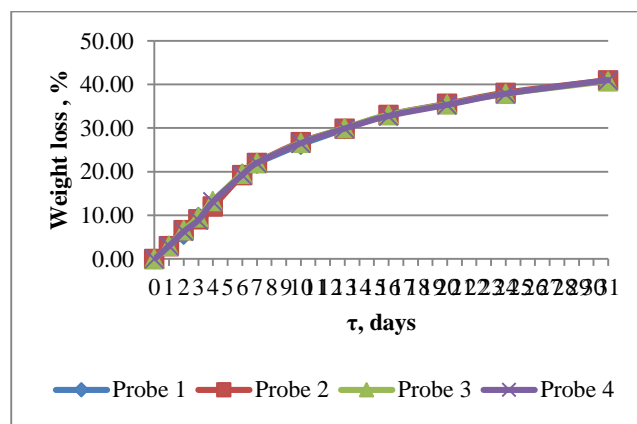


Fig. 2 Weight loss evolution during the sausage maturation-drying

In maturation phase weight losses in all 4 probes are 21,9–22,1%, in drying phase weight loss attend to 40,8–41,0%.

From this figure we can notice that added concentration of starter culture does not influence the weight losses. Water activity at the end of sausage drying constitute for probe 1 – 0,899, probe 2 – 0,874, probe 3 – 0,868 and probe 4 – 0,866, and moisture percentage for probe 1 – 30,28 %, probe 2 – 31,35%, probe 3 – 30,91% and probe 4 – 31,04%.

Have been tested 4 probes of raw fermented-sausages with different starter cultures added, from which in probe 1 –10g starter culture and 800g dextrose per 100g raw material.

In probe 2–10g of starter culture and 1000g dextrose per 100kg raw material, probe3 –20g starter culture and 800g dextrose, probe 4–29g starter culture and 1000g dextrose per 100kg raw material.

The changes that take place during the maturation process in these probes of raw fermented sausages – pH evolution and weight losses are represented in fig. 3 and 4.

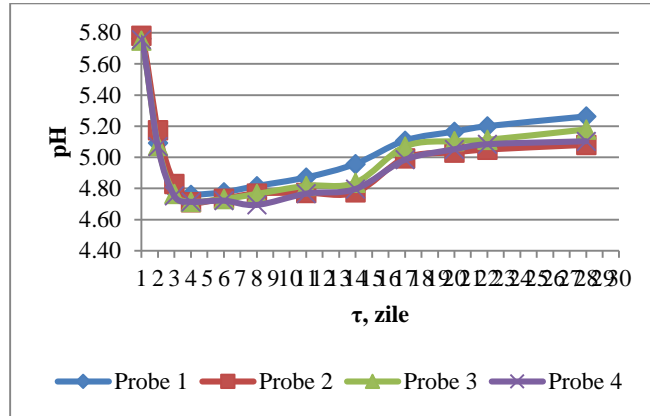


Fig. 3 pH evolution during sausage maturation-drying

Raw-fermented sausage fermentation with added starter cultures depends from the quantity of added dextrose. In the 1st probe with 10g culture MF 42-R and 800g dextrose pH during fermentation phase has declined from the initial value 5,76 to 4,76. This pH is attended in the 4th day of fermentation. In drying phase pH grows till 5,26.

In probe 2 with 10 g culture MF-42R and 1000g dextrose pH declines from 5,76 till 4,71 in the 4th day of fermentation. In drying phase pH grows till 5,08. In the 3rd probe with 20 g culture and 800g dextrose pH declines from 5,72 till 4,72 in the 4th day, then grows in drying phase till 5,18. In probe 4 with 20g MF 42-3 and 1000g dextrose pH declines from 5,75 till 4,72 in the 4th day and only in day 8 attend minimum value 4,7. From that follows: bigger quantity of dextrose and culture, longer fermentation period and lower pH level. When adding a small quantity of dextrose and culture pH level 5,26 is attended, a higher level then when bigger quantities of dextrose and starter culture are added.

When adding a higher concentration of dextrose, acidification is quicker because starter cultures ferment the sugars, producing a bigger quantity of lactic acid.

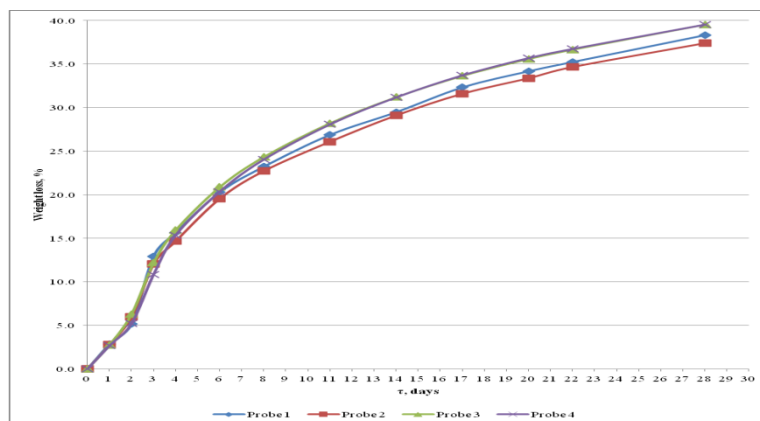


Fig. 4 Weight loss evolution during sausage maturation-drying

In maturation phase weight loss percentage in all 4 probes is 22,7–24,4 %,but in drying phase weight loss attend till 37,4–39,60 %. More essential weight loss are attested in probe 3 and 4 .

Water activity at the end of sausage drying constitutes for probe 1 –0,89 probe 2–0,882, probe 3–0,865 and probe 4–0,875 and moisture percentage for probe 1–29,79%, probe 2 – 29,02%, probe 3 – 27,66% and probe 4 – 26,34%.

Conclusion

1. Starter culture MF 42–R application at raw–fermented sausages production have the following results: lowers the pH level till 5,2÷5,3, attend $a_w < 0,90$, humidity $a_w < 0,90$. This parameters can assure the microbiological stability of the final product.
2. Starter culture MF 42–R accelerates the fermentation process, allows the pH decade till 5,2 during 24–48h.
3. The maturation–drying phase with addition of starter culture MF 42–R lasts 14–16 days comparative with 25–30 days characteristic for the classic method.
4. When preparing the sausage mixture it is necessary to add glucides, that are metabolized by lactic bacteria from starter culture. Grind acidification is more intensive when the content of dextrose is 1000g/100kg.

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