Einige die Stabilität der Fleischfarbe bei Dauerwurst - Typ "Lukanka" - bestimmende Faktoren.

N. NESTOROV, N. DILOVA, A. GROSDANOV

Institut für Fleischwirtschaft, Sofia, Bulgarien

Es wurden Untersuchungen zur Feststellung des Einflusses einiger endogener Faktoren des Fleisches, sowie auch einiger Additive und bakterieller Starterkulturen auf die Stabilität der Farbe bei Dauerwurst - Typ "Lukanka" - durchgeführt. Als Kennwert für die Stabilität wurde das Ausmass der Verminderung des Nitrosopigmentes nach einer Standardbeleuchtung bei niedrigen Temperaturen festgelegt.

Bei diesen Untersuchungen wurde festgestellt, dass der relative Gehalt an Nitrosomyoglobin, die Gesamtreduktionskapazität und die Menge der freien Thiolgruppen nicht solche Faktoren darstellen, die getrennt für die Stabilität der Farbe bestimmend sein können. Die Zugabe von Starterkulturen mit hoher Katalasenaktivität kann auch nicht zur Erzielung einer stabileren Farbe beitragen. Die Menge der Restnitrate bei der Salpeterpökelung und das Vorhandensein von Ascorbat bei der Nitritpökelung sind für die Stabilität der Farbe entscheidend.

Some factors determining colour stability in 'Loukanka' type raw-dried sausages

N. NESTOROV, N. DILOVA, A. GROZDANOV

Meat Technology Research Institute, Sofia, Bulgaria

Studies were carried out to determine the effects of some endogenous factors of meat, additives, and bacterial starters on colour stability in raw-dried sausages of the 'Loukanka' type. The degree of nitroso pigment decrease after standard illumination in the cold was determined as an index of stability.

It was found that the relative content of nitrosomyoglobin, the total reduction capacity, and the amount of free thiol groups are not each in itself determining factors for colour stability. The addition of bacterial starters of a high catalase activity does not contribute to obtaining a more stable colour. The amount of residual nitrates (in saltpetre curing) and the presence of ascorbate (in nitrite curing) are decisive for colour stability.

Certains facteurs déterminant la stabilité de la couleur dans les saucissons secs type "Loukanka"

N. NESTOROV, N. DILOVA et AL. GROZDANOV

Institut de recherches sur la viande, Sofia, Bulgarie

On a effectué des études pour établir l'influence de certains facteurs endogènes de la viande, certains additifs et cultures starters bactérielles sur la stabilité de la couleur de la viande dans les saucissons secs type "Loukanka". Comme indice de la stabilité a été déterminé le degré de diminution du nitrosopigment après un éclairage standard à froid.

On a constaté que la teneur relative en nitrosomyoglobine, la capacité totale de réduction, ainsi que la quantité de groupes de thiol libres n'étaient pas, pris à part, des facteurs déterminants en ce qui concerne la stabilité de la couleur de la viande. L'adjonction des levures bactérielles qui avaient une activité de catalase élevée ne contribuait pas à l'obtention d'une couleur plus stable. La quantité de nitrates résiduels apparaissait comme facteur décisif pour la stabilité de la couleur lors de la salaison au salpêtre, la présence d'ascorbate étant facteur déterminant pendant la salaison au nitrite.

Некоторые факторы, определяющие стабильность цвета при сыро-вяленых колбасах типа "Луканки"

Н. НЕСТОРОВ, Н. ДИЛОВА, А. ГРОЗДАНОВ

Институт мясной промышленности, София, Болгария

Проведены исследования для определения влияния некоторых эндогенных факторов мяса, добавок и бактериальных заквасок на стабильность цвета при сыро-вяленых колбасах типа "Луканки". В качестве показателя стабильности определяли степень уменьшения нитрозо пигмента после стандартного освещения в холоде.

Установлено, что относительное содержание нитрозомиоглобина, общая восстановительная способность и количество свободных тиольных групп в отдельности не являются определяющими факторами для стабильности цвета. Добавление бактериальных заквасок высокой каталазной активности не способствует получению более стабильного цвета. Количество остаточных нитратов при посоле селитрой и наличие аскорбата при посоле нитритом являются решающими для стабильности цвета.

Some factors determining colour stability in 'Loukanka' type raw-dried sausages

N.NESTOROV, N.DILOVA, A.GROZDANOV

Meat Technology Research Institute, Sofia, Bulgaria

The fading of fresh-cut surface colour of cured meat when exposed to visible light and air is one of the most difficult problems in quality maintenance.Some works dealing mainly with colour fading of cured pork hams have benn published (Henrickson et al,1969; MacDougall,1974; Mandigo and Konert,1973), but only a little is known about this problem in raw-dried meat products (Coretti,1971; Wirth,1973).The purpose of this study is to elucidate the importance of some factors affecting the colour stability of 'Loukanka' type raw dried sausage.

Materials and methods

The studies were carried out on 'Loukanka' raw-dried sausage, whose recipe and technology were described previously by us (Nestorov et al,1975).The curing mixtures content and the type of additives and starter cultures are reported in the three tables before the experimental results.

The nitrosylmyoglobin content (%NOMb) and colour stability (as first order rate constant of light fading - $K_{1st}x10^3$) were established after the method of Hornsey (1957). The nitrates and nitrites content was determined after ISO method. The measurement of the catalase activity was carried out after the procedure of Marton and Kovacs (1966) and was expressed as a Katalase-Fähigkeit (Kat.f.) after Lück (1962). The oxodiene value (OV) was used as an index for lipid oxidation (Fishwick and Swoboda,1977).The reduction ability (RA) and the free SH-groups content were determined as was described previously.

Results

In the first group of experiments are studied the effects of different curing mixtures on the colour stability (table 1).The content of the free nitrites and nitrates in the product greately depends on the type of curing, but the nitrsylmyoglobin content is not effected.

Table 1. The effect of curing mixture content on the light fading

Exp.No	Curing mixture (ppm)			Free NO_3(ppm)	Free NO_2(ppm)	%NOMb	Free SH groups mM/100 g	RA	$K_{1st}x10^3$
	KNO_3	$NaNO_2$	Na asc.						
1	1000	-	-	135	235	75	-	-	7,3
2	400	-	-	60	25	74	0.10	1,4	7,8
3	250	120	-	49	26	73	0,45	1,4	6,7
4	-	120	-	9	10	75	0,50	1,9	15,1
5	-	120	300	9	8	75	0,75	1,7	2,3

Table 2. The effect of pH-value of the product on the light fading

Exp.No	Curing mixture (ppm)				Free NO_3 ppm	Free NO_2 ppm	%NOMb	$K_{1st}x10^3$
	$NaNO_2$	Na asc	Gdl	pH				
6	120	300	0,7%	4,80	54	8,7	79	4,1
7	120	300	0,4%	5,10	25	6,1	74	3,5
8	120	300	-	5,40	40	7,8	65	7,4
9	120	-	-	5,60	79	11,7	62	8,7

Table 3. The effect of catalase activity on the light fading

Exp.No	Curing mixture	Starter culture	Katal.f.	Free NO_3	Free NO_2	OV	$K_{1st}x10^3$
10A	400 ppm KNO_3	No	$5,5x10^{-3}$	163	73	0,24	5,6
10B	400 ppm KNO_3	Microc. MM	$12,3x10^{-3}$	81	35	0,07	10,2
11A	400 ppm KNO_3	No	$9,8x10^{-3}$	126	34	0,14	6,5
11B	400 ppm KNO_3	Microc. M-46	$10,3x10^{-3}$	49	9	0,13	8,2

The values for the free thyol groups and reduction ability are heigher in the products with the lower free nitrates and nitrites content, but this dependence is not valid for all studied cases. The products cured with 120 ppm $NaNO_2$ have the most colour stability; these from experiments with nitrate or mixed curing fade with intermediate rates. The colour stability is best preserved in the products prepared by curing with nitrite in the presence of ascorbate.

The effect of pH is studied in the second group of experiments (table 2). Glucono-delta-lacton is used as a acidifying agent. There are no significant differences in the content of the free nitrates and nitrites, but the relative part of NOMb to total pigment varies greately in different experiments. Heigher pH values result in lower NOMb-content and faster rate of light fading.

Starter cultures are used in the 3rd group of experiments (table 3). The two micrococcus strains possess high catalase and nitratreductase activity, which are considered as important indices for practical use of the microorganisms. The addition of the MM-strain results in a heigher catalase activity, a lower content of free nitrates and nitrites, and a lower oxodiene values. The colour stability is lower in the products with an addition of starter cultures, than in the control products.

Discussion

According to Coretti (1971) at least 75% of the myoglobin must be transformed to its nitrosyl complex in order to assure good colour stability. Our results however, did not fully confirm his findings. We established that different experimental products with equal content of nitrosylmyoglobin (about 75% of the total pigment) exhibit different colour stability due to the presence of free nitrates. Heigher levels of nitrates result in slower light fading rates. When the part of the nitrosylmyoglobin drops as low as 60-65%, the colour stability becomes poor. Such is the case when the pH value of the product is above 5,5 and the free nitrates and nitrites content is very low.

The addition of micrococcus starter cultures (at least the ones used in our experiments) did not affect the colour stability in the desired direction. The simultaneous presence of heigh catalase and nitrat-reductase activity results in a good, but unstable colour. The obvious reason is decreased concentration of free nitrites and nitrates. The lower extend of lipid oxidation (the case with the MM strain addition) can not contribute to a better colour stability.

The inherent factors, such as total reducing ability, free and bound SH-groups, can not independently be decisive factors for a slower or faster light fading. However, when a strong reducing agent such as ascorbate is added, colour stability can be improved significantly. Only in the presence of ascorbate a pure nitrite curing of raw-dried sausages is possible.

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