

SAUSAGE

INTRODUCTION

Texture is an important factor in determining the quality of sausage.

Texture depends, in large part, on the quality of the meat protein used. Control and standardization of texture is therefore not easy.

TG makes it easier. Thanks to its capacity to cross-link protein molecules, this innovative enzyme strengthens the protein network through~ polymerization. This means that the various rheological properties of sausage -ranging from solidity, elasticity, and cohesiveness through water-retention capacity- can be clearly improved. Since only a small amount of TG is required to achieve the desired result, there is no detrimental effect on flavour.

TG may be seen as a valid processing aid; its activity is destroyed by heat. No activity remains in the final product.

APPLICATION
IDEAS

This should be determined by prior testing since each type of sausage has different needs. However, in principle, amounts of 0.01-0.05% are recommended when TG activity is at 1,000U/g.

Since the amount of TG used is small, it is important to ensure that it is uniformly mixed into the product. We recommend that TG is included in a premix with other powdered ingredients-such as salt and spices-and then added to the meat.

RECOMMENDED
AMOUNT

There are a number of ways in which TG can be used. Here are a few examples:

1. Improved Texture

- The texture of cooked Frankfurter type sausages can be improved as seen in Fig 1. The addition of only a small amount of TG enhances “breaking strength” (solidity) and “strain” (elasticity).
- The texture of canned sausage of the Frankfurter type often suffers from the effects of the high temperatures required for sterilization. The addition of TG improves the quality of canned sausage and makes for excellent-bite. (See Fig 2)

2. Water Retention

This is an important factor in sausage quality. As seen in Table 1, the use of TG promotes greater water retention without harm to texture.

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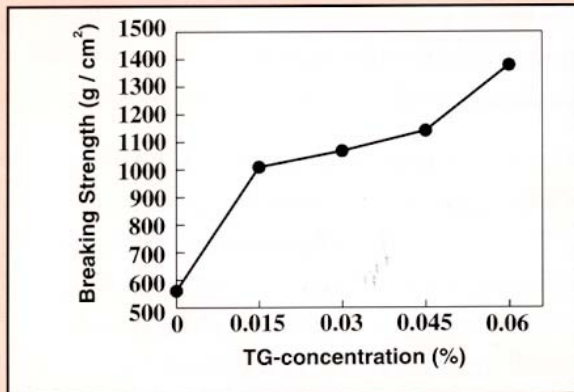


Fig 1 Effects of TG Concentration on Breaking Strength in Cooked Sausage

<Formulation> Pork leg: 45%, Pork fat: 25%, Ice: 25%, etc.
 <Cooking conditions> Dry: 60°C–30min., Smoke: 60°C–10min., Boil: 75°C–30min.

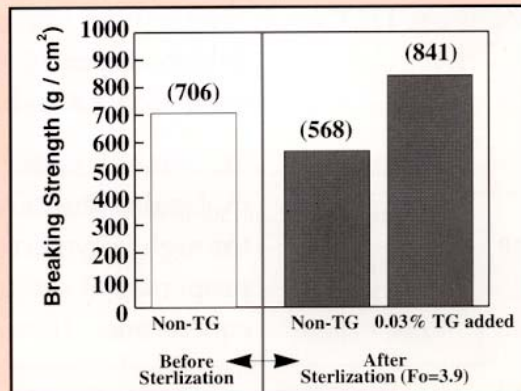


Fig 2 Improvement of Texture in Canned Sausage by Applying TG

	Non-TG 20% water added	0.03% TG 26% water added
Breaking Strength	580	700g/cm ²
Strain	21	27%
Water Loss during Cooking	7	6%

Table 1 Improved Water Retention

<Formulation> Pork leg: 51% (Non-TG) and 45% (TG added)
 <Cooking conditions> Dry: 60°C–15min., Boil: 75°C–30min.

	A	B	C
Breaking Strength	374	239	465g/cm ²
Strain	15	13	18%
Water Loss during Cooking	3.1	8.5	2.2%

Table 2 Substitution of Phosphates in Sausage

A: 0.3% phosphate added, B: None, C: 0.025% TG added
 <Formulation> Pork leg: 45%, Pork fat: 25%, Ice: 26%, etc.
 <Cooking conditions> Dry/Smoke: 40°C–45min., Boil: 80°C–40min.

3. Substitution of Phosphates

Phosphates are common ingredients in sausage manufacture because they help with cohesiveness and water retention. Table 2 shows that TG has an effect that allows the manufacturer to produce a phosphate-free sausage.

4. Use of Low-grade Materials

Using meat of a low quality in producing sausage implies poor protein functionality. So while there is an economic attraction to this option, it is not exactly desirable.

Adding TG to the process improves functionality: lower-grade meat ingredients can be used without detriment to the final result.

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COOKING CONDITIONS

TG is most effective at temperatures of 50-55°C. Above 60°C, its effectiveness quickly diminishes. Use is therefore determined in part by the time-temperature axis of the production process. (See Fig 3)

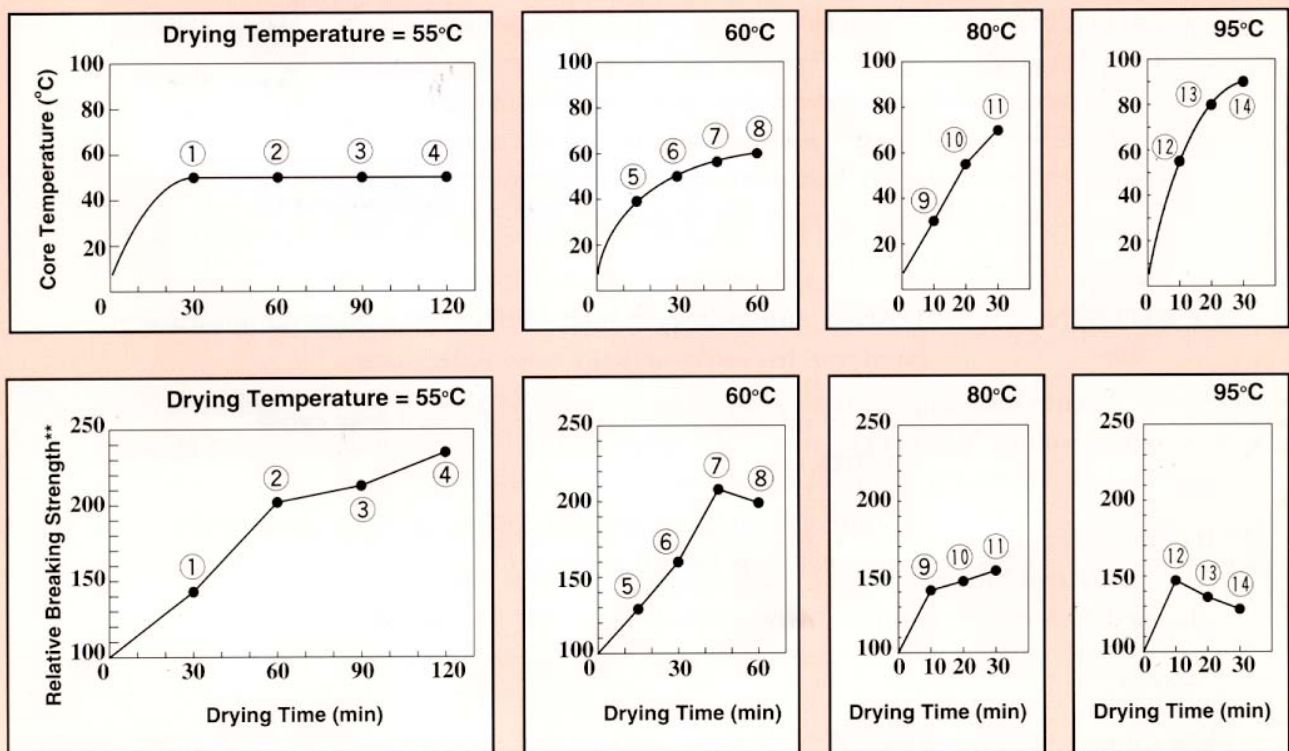


Fig 3 Influences of Drying Time and Temperature on the Breaking Strength of TG-added Sausage*

* The sausage of 3 cm in diameter was prepared by boiling at 75°C for 30 min. after drying at each condition and then the breaking strength was measured by puncturing test. The use level of TG was 0.03%, and the formulation of the sausage was the same as in Fig 1.

** The breaking strength of non-TG sausage = 100

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INACTIVATION

In Table 3 we see the effect of heat on TG. For example, when the core temperature reaches 75°C during cooking, TG is rendered inactive and it ceases to be an element in the final product.

Core Temperature	Holding Time
70°C	within 15 min.
75°C	within 5 min.
80°C	within 1 min.

Table 3 Inactivation of TG

CAUTION

1. Avoid unnecessary contact with enzyme preparations during handling. In case of spillage rinse with water.
2. Avoid inhaling enzyme repeatedly as it may cause sensitization.
3. Store container in a dry and cool place. After opening the package, please keep it in freezer.