Egg Derivates

Enzymatic Treatments

INTRODUCTION

From it's inception in 1899 in Japan as a pharmaceutical business, **Amano Enzyme** has been a company in deep harmony with nature, and fully rooted in Japanese culture and traditional values. In 1948, this business expanded to use the process of koji fermentation (traditionally used to create soy sauce, miso, and sake).

As an enzyme production company Amano believes that biotechnology is a prime example of human intelligence acquired through the harmonized co-existence with nature.

At the core of biotechnology is enzymology, and the various practical applications of enzymes to enhance and contribute to society and the human living condition.
Amano Enzyme provides **specialties** and **taylor made** solutions for the customers.

ENZYMES

Enzymes are proteins that act as catalysts in all living organisms; as catalysts, enzymes serve as compounds that increase chemical reactions in biological systems.

Enzymes are affected by a number of conditions, such as temperature and pH (acidity), and are subject to inhibition by various means.

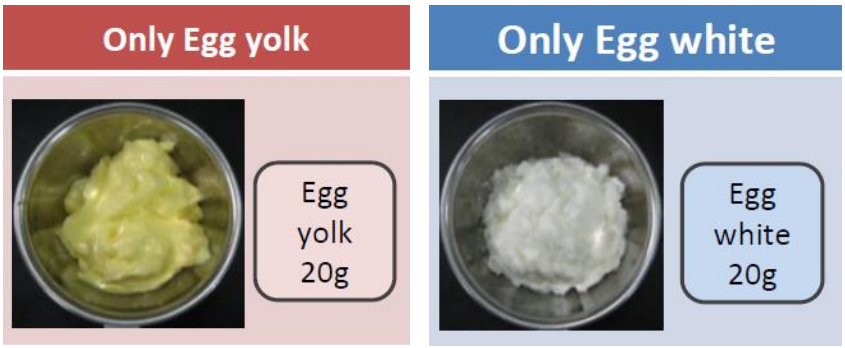
Enzymes are classified by the type of reaction they catalyse and the substance (called a substrate) they act upon. It is customary to attach the suffix "ase" to the name of the principle substrate upon which the enzyme acts.

Enzymes function as highly selective catalysts in such a way that they selectivity catalyze specific reactions (reaction specificity) and specific materials (substrate specificity).

EGG WHITE MAYONNAISE

TARGET: *IMPROVE MOUTHFEEL AND CREAMINESS*

Egg white mayonnaise is a good solution to obtain a light mayonnaise with no fat and low cholesterol.



The main issue of making egg white mayonnaise is reaching the same mouthfeel and creaminess of standard yolk mayonnaise.

AMANO SOLUTION

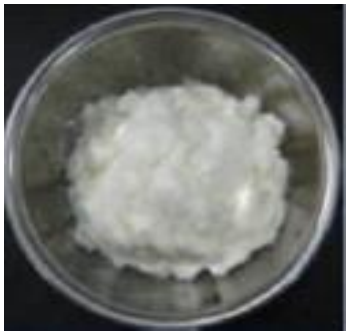
Making partial hydrolyzation of the egg white through an enzymes treatment.

METHOD:

A Partial hydrolyzed Egg white

1. Mixing egg white
2. pH 7-8 adjustment
3. Enzymes reaction:
   - **Protease MSD:** 0,4% - 60 min at 50°C
   - **Thermoase PC10F:** 0,2% - 10 min at 50°C + 30 min at 65°C
4. Inactivation: 5 min at 90°C
5. Cooling, homogenization

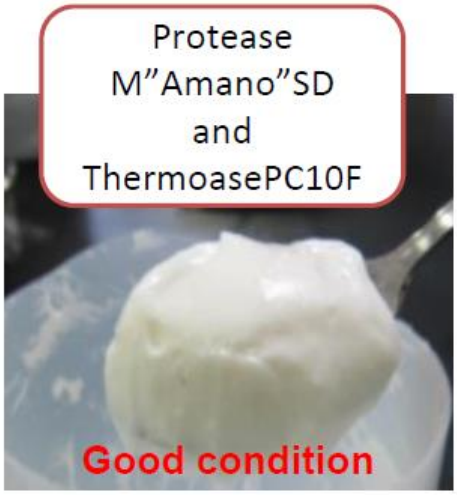
Amano tests on Partial Hydrolized Egg White:

CONTROL	PROTEASE MSD + THERMOASE PC10F
	

B White mayonnaise preparation: mixing with blender

Ingredients	g
Egg Yolk or Partial hydrolyzed Egg white	49,45
Salad oil	31,00
Vinegar	10,00
Salt	7,00
Pepper	0,03

Amano tests:



GOOD CREAMINESS

GOOD MOUTHFEEL

THERMO-STABLE EGG YOLK

TARGET: *MAKE LIQUID PASTEURIZED EGG YOLK*

Normally egg yolk becomes hard at 65°C.

However, enzyme-treated egg-yolk keeps liquid over 65°C.

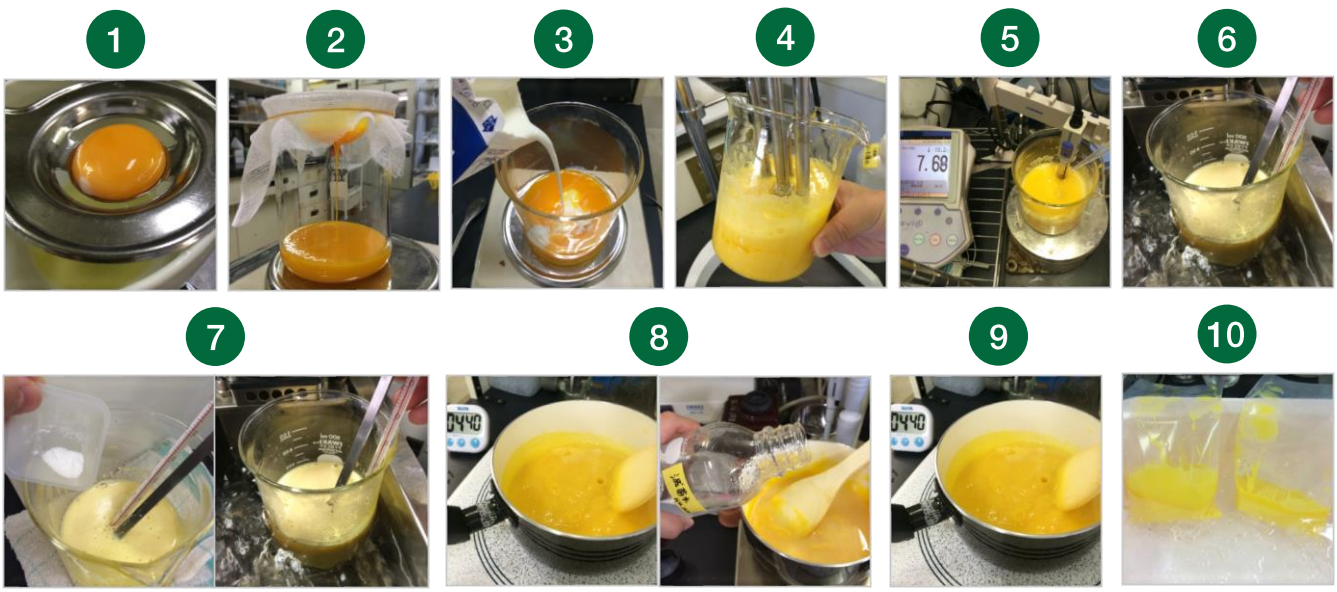
Moreover, by enzyme treatment the thermo-stable egg yolk can be stored long time at room temperature, without microbial contamination.

AMANO SOLUTION

Using thermoase in order to make a thermo-stable egg yolk in liquid format, increase stability to freezing and thawing cycles and the shelf life.

METHOD:

1. Separation of egg yolk
2. Filtration
3. Add water
4. Homo-mixing
5. pH adjust to 7,5-8,0
6. Heat up to 55°C
7. Enzyme treatment: add 0,2% of **Thermoase PC10F:** 10 min at 55°C; then 30 min at 65°C
8. Inactivation and sterilization: boiling for 5 min, then add sterilize (5 min at 100°C)
9. Adjust the initial weight
10. Packing and cooling

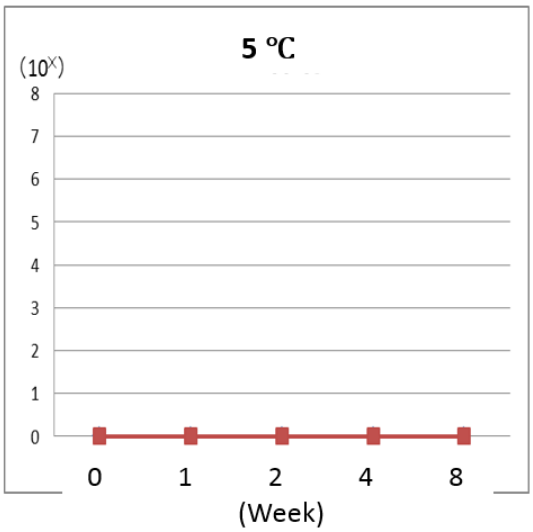


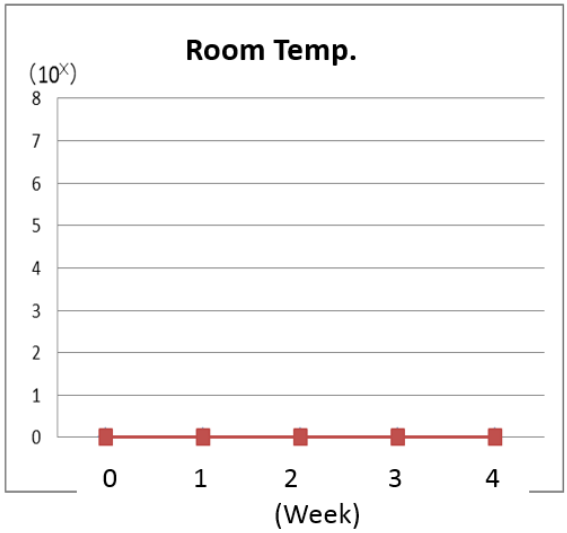
Enzyme- treatment benefits:

- Liquid format at high temperature (possibility to increase pasteurization T°)
- > Shelf Life (no microbial contamination)

LIQUID FORMAT

LONGER SHELF LIFE





CUSTARD CREAM CASE:

- Better mouthfeel
- More creaminess
- More shine
- Smooth structure, without clamps

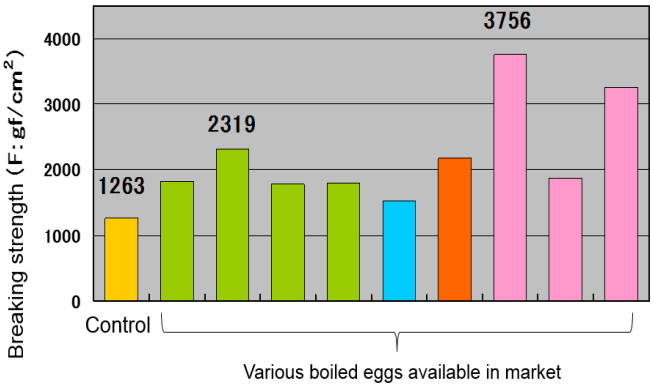
Other possible applications: Tiramisù, carbonara sauce, …

Thermoase enzyme can be use also on **egg white** with same results.

STERILIZED BOILED EGG

TARGET: *IMPROVE SOFTNESS OF STERILIZED BOILED EGG*

Physical comparison of boiled egg



By comparing the normal boiled egg with various sterilized boiled eggs available in the market, an increment of hardness in the sterilizied boiled eggs is noticeable.

AMANO SOLUTION

using protease in order to avoid egg's harden issue after heat sterilization

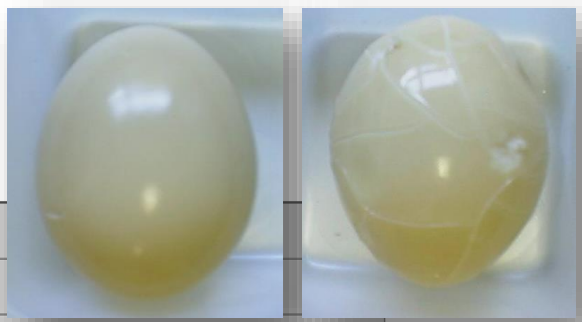
METHOD:

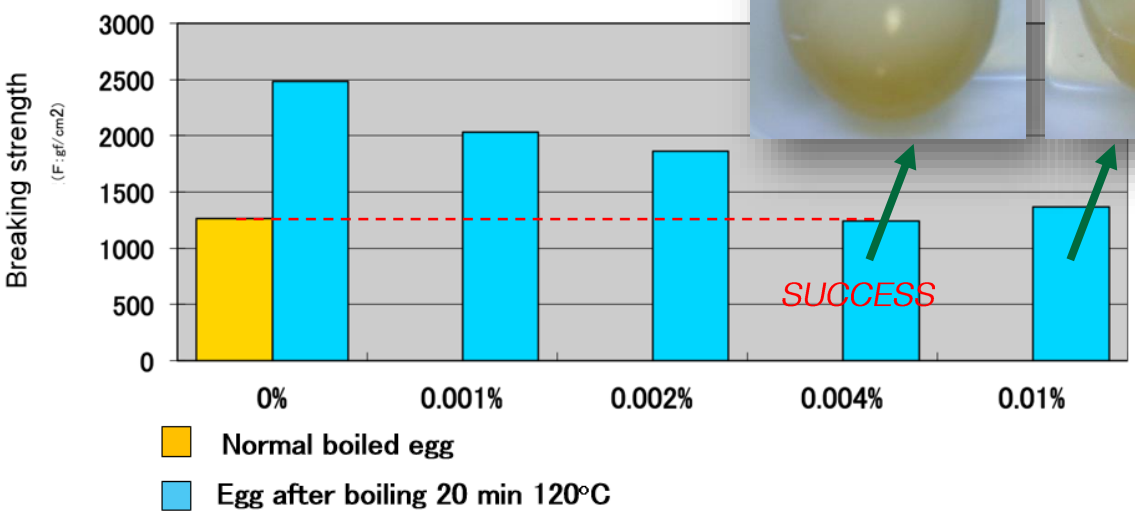
1. Make boiled egg
2. Prepare protease solution: 0,004% of **Protin NY100**
3. Dip boiled egg in protease solution; enzyme reaction: 1 hour at 37°C
4. Inactivation: boiling for 20 min at 120°C

SOFT CONSISTENCY

Amano tests:

*Same hardness of normal boiled egg, using **0,004% of Protin NY100***





GLUCOSE REMOVAL

TARGET: *IMPROVE EMULSIFYING PROPERTIES AND TEXTURE*

AMANO SOLUTION

Using glucose oxidase to remove glucose and other sugars from egg whites.

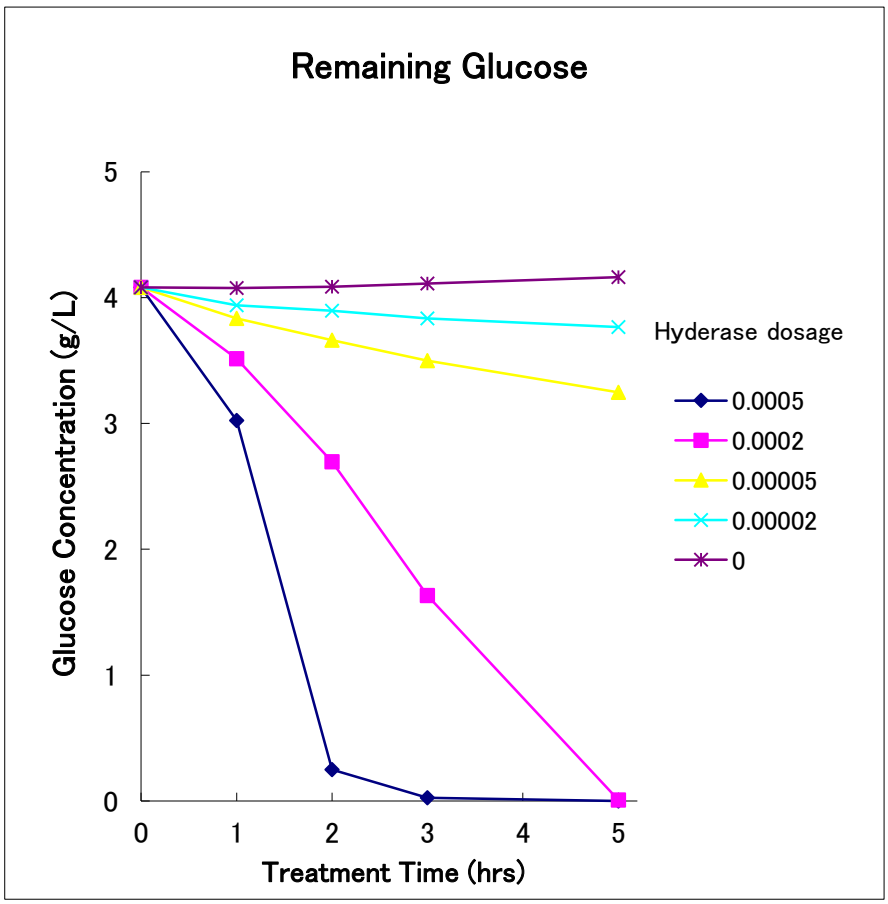
METHOD:

1. Put 20mL egg white into Erlenmeyer flask
2. Add to the egg white solution 0,05% of **Hyderase**
3. Keep stirring at 30°C for 3-5 hours

Enzyme- treatment benefits:

- Yeast selection during fermentation
- Slowing growth of microorganisms
- Reduction of off smells
- Reduction of browning

Amano test



LONGER SHELF LIFE

OFF SMELLS REDUCTION

BROWING REDUCTION

EGG IN MEAT APPLICATION

TARGET: *AVOID OFF SMELL AND BROWING*

AMANO SOLUTION

By making a partial hydrolyzation of the egg white (PHEW) is possible to bind water and prevent weight loss in the finish meat products.

METHOD:

1. Mixing Egg White
2. pH adjust to 7,0-8,0
3. Enzyme treatment: add **Thermoase PC10F** at 0,2%-0,8% of Egg White weight**:** 10 min at 55°C; then 30 min at 65°C
4. Inactivation: 5 min at 100°C
5. Cooling then Mixing

1 2 3 4 5

Partial Hydrolysis
Heat Denaturation

PARTIALLY HYDROLYZED EGG WHITE (PHEW):

- Good emulsifying properties with less bitterness
- Texture modification

HAMBURGER PATTY CASE:

STANDAR RECIPE:

Ingredienti	g
Ground beef and pork	100,00
Onion	60,00
Egg	20,00
Milk	17,00
Bread crumb	7,00
Salt	0,10

→ Replaced by PHEW

METHOD:

1. Onion stir-fried and then cooled
2. Mixing all the ingredients together
3. Forming: 50,0 mm diameter, 18,7 mmthickness
4. Cooking on hot plate

LESS WEIGHT LOSS

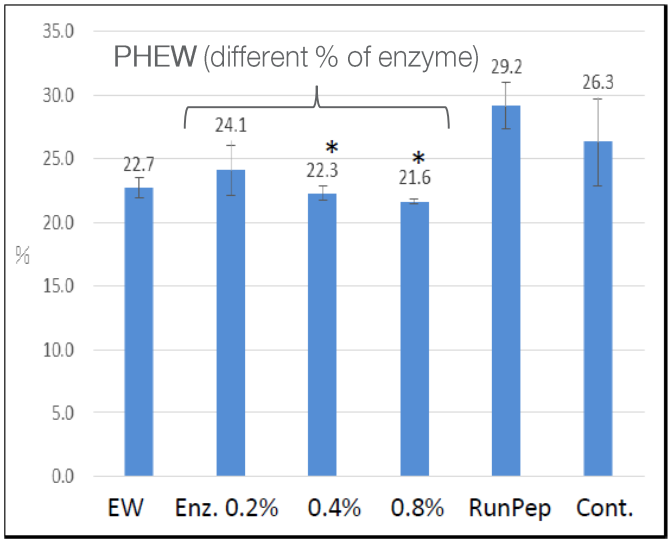
TEXTURE IMPROVEMENT

Amano tests: adding rate of samples against meat weight.

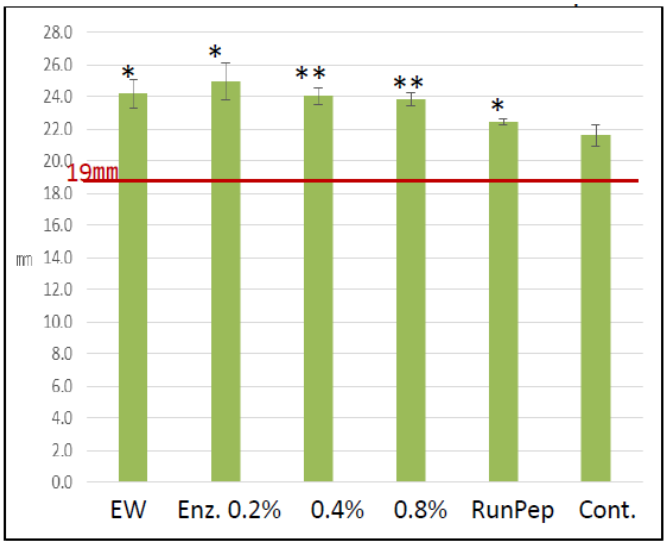
Samples: egg white (EW), PHEW (0,2%, 0,4%, 0,8% enzyme dosage), RunPep (Egg white peptide), control (water).

Rate of weight loss:

(%) = Weigh loss/initial weight x 100



Thickness of hamburger (mm):



BENEFITS:

- Significant reduction of weight loss %
- More thickness after cooking
- Texture improvement: more softness and juiciness

SAUSAGE CASE:

METHOD:

Adding rate of samples against meat weight.

Samples: egg white (EW), PHEW (0,2%, 0,4%, 0,8% enzyme dosage), RunPep (Egg white peptide), control (water).

Ratio tested: **100%** and **50%** (weight sample/weight meat)

1. Mixing in food processor
2. Staffing
3. Boiling at 80°C at 40min
4. Cooling 1 hour

LESS WEIGHT LOSS

TEXTURE IMPROVEMENT

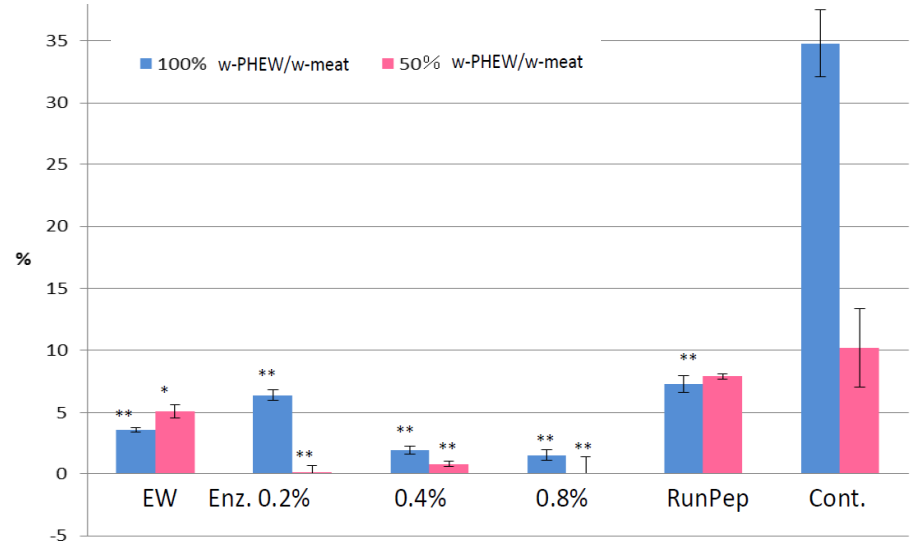
1

2

3

4

Amano results:



BENEFITS:

- Significant reduction of weight loss %
- More elasticity after cooking
- Texture improvement

GRILLED MEAT CASE:

METHOD:

Adding samples at 50% of meat weight.

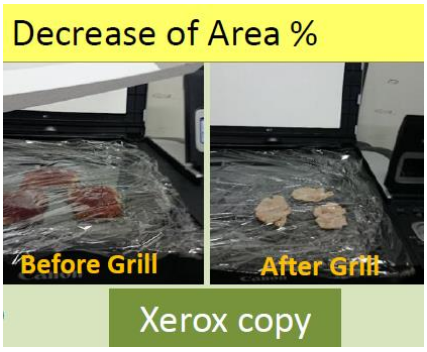
Samples: egg white (EW), PHEW (0,2%, 0,4%, 0,8% enzyme dosage), RunPep (Egg white peptide), control (water).

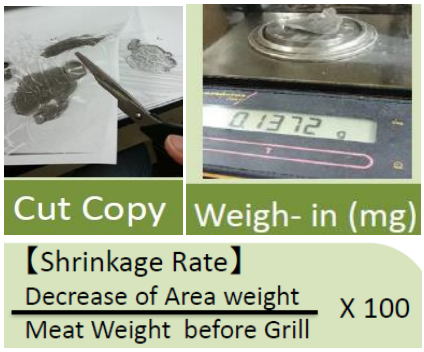
1. Slice pork (2-3mm)
2. Dipping for 2 days at cold
3. Grill

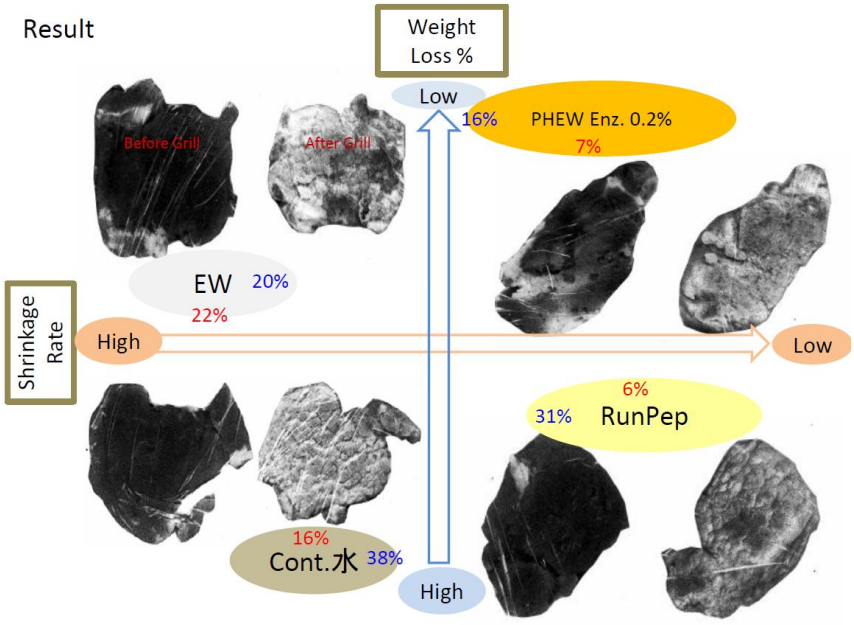
LESS WEIGHT LOSS

TEXTURE IMPROVEMENT

Amano tests:







BENEFITS:

- Reduction of shrinkage %
- Reduction of weight loss %
- Texture improvement

AMANO SOLUTIONS: OVERVIEW

Enzyme	Application and Benbefits	Enzyme treatment
Hyderase *(work on egg white)*	Increment of stability (no microorganism), reduction of off smells and browning	**Dosage:** 0,05% **pH:** 6-8 **Reaction:** 180-240 min at 30°C **Inactivation:**
Protease MSD *(work on egg yolk and egg white)*	**Egg Whyte Mayonnaise** (in combination with Thermoase PC10F and Protin NY100): no fat, low cholesterol, goog creaminess, good mouthfeel, stability to freezing and thawing cycles	**Dosage:** 0,4% **pH:** 6-8 **Reaction:** 60 min at 50°C **Inactivation:** 5 min at 90°C
Protin NY100 *(work on egg yolk and egg white)*	**Boiled egg:** soft consistency after heat sterilization	**Dosage:** 0,004% **pH:** 6-8 **Reaction:** 60 min at 37°C **Inactivation:** 20 min at 120°C
Thermoase PC10F *(work on egg yolk and egg white)*	**Egg Whyte Mayonnaise** (in combination with Thermoase PC10F and Protin NY100): no fat, low cholesterol, goog creaminess, good mouthfeel, stability to freezing and thawing cycles	**Dosage: 0,2%** **pH:** 6-8 **Reaction:** 10 min at 50°C + 30 min at 65°C **Inactivation:** 5 min at 90°C
	Custard Cream: better mouthfeel, more creaminess, more shine, smooth structure	**Dosage:** 0,2% **pH:** 7,5-8,0 **Reaction:** 10 min at 55°C **Inactivation:** 20 min at 80°C or 5 min at 100°C
	Liquid egg yolk: liquid format after pasteurization, longer shelf life	**Dosage:** 0,2% **pH:** 7,5-8,0 **Reaction:** 10 min at 55°C **Inactivation:** 20 min at 80°C or 5 min at 100°C
	Meat Processing: less weight loss % and texture improvement	**Dosage:** 0,2-0,8% **pH:** 7,0-8,0 **Reaction:** 10 min at 55°C + 30 min at 65°C **Inactivation:** 20 min at 80°C or 5 min at 100°C