



# Advanced food packaging that contributes to reduction of food waste

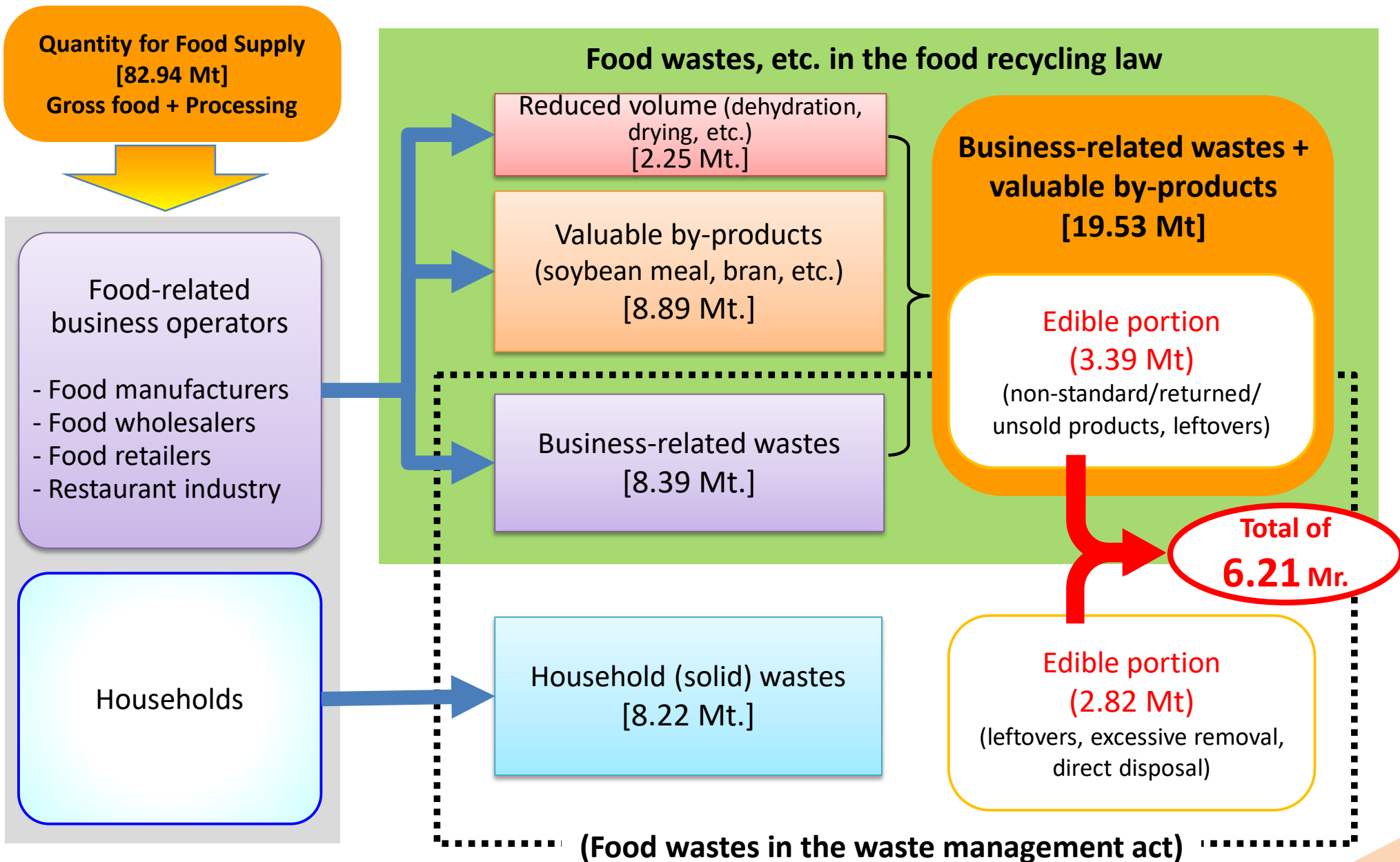
**(Second version)**

**農林水産省**

Food Industrial Policy Office  
Biomass Policy Division  
Food Industry Affairs Bureau



# Food waste generation (Estimation in FY 2014)



- 
- Packaging that reduces food waste**
- Preserve freshness
  - Extend best-before date
  - Reduce damage during transportation
  - Others
  - Conveniently sized and individually packaged
- Examples of packaging:
- Soy sauce pouch (Kikkoman)
  - Instant noodle soup cup (Cup Noodle)
  - Chicken and vegetable package (Ajinomoto)
  - Individually wrapped dumplings (Dumpling)
  - Instant noodle soup package (Ajinomoto)

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Listing **72**  
examples!!



### 鮮度の一滴シリーズ



After opening  
Approx. 30 days

Approx. 120 days

Approx. 180 days

From August 2015

### (Improvement of packaging)

- Change soy sauce bottle to pouch-type holder with special reflux stopper
- Preserve freshness and prevent oxidation after opening
- Cut weight by approx. 39% in comparison with PET bottle



### (Extend freshness)

- Used to recommend consumption within 30 days or so after opening in the case of conventional glass bottles and PET bottles. Realize the maintenance of freshness and prevention of oxidation for about 180 days after opening.

### いつでも新鮮シリーズ



#### (Improvement of packaging)

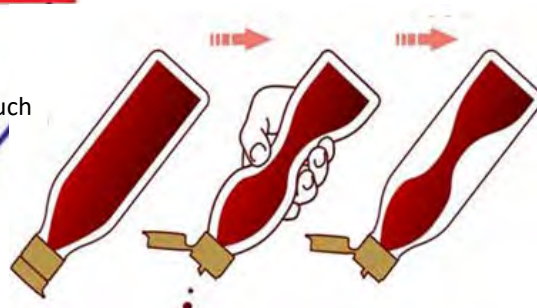
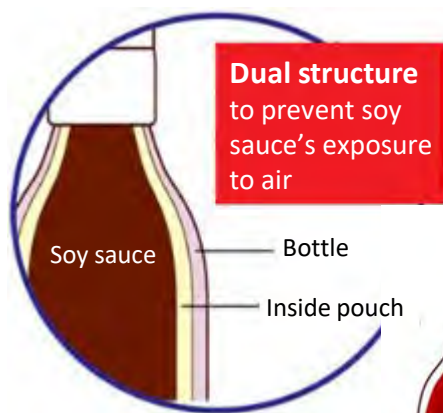
- Dual structure of the bottle prevents soy sauce's exposure to oxygen after opening and so realizes its high preservability.
- Amount of dispensing soy sauce is adjustable from small to large depending on the strength of squeeze.



#### (Reduction of food waste)

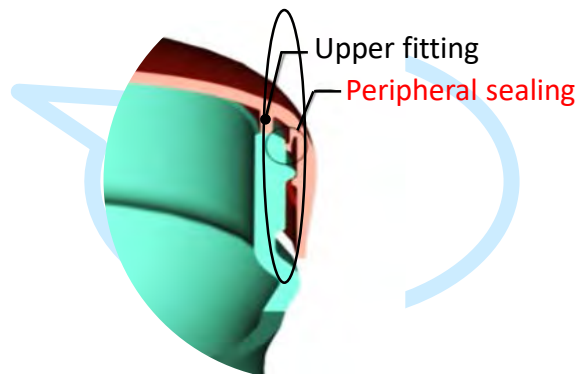
- Preserve the freshness of soy sauce for 90 days after opening by preventing the degradation of the content through oxidation.
- Residual in the bottle is reduced as soy sauce can be dispensed to the last drop by squeezing it.

From August 2011





### 「ほんだし®」60g瓶



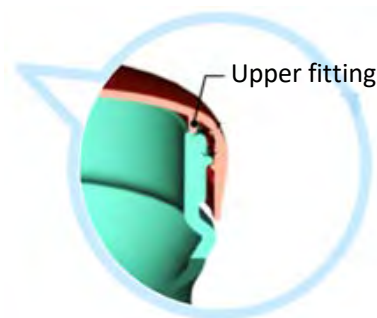
#### (Improvement of packaging)

- Attachment of rib inside the cap to seal the upper and peripheral parts of the holder improves airtightness.



#### (Reduction of foot waste)

- Curb degradation of quality after opening product
- Prevent caking with sealing cap
- Extend flavor

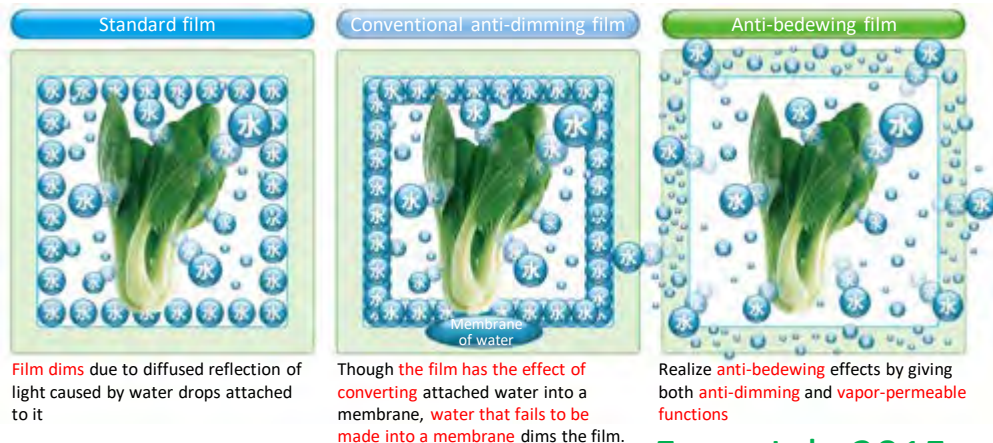


Conventional holder

From 2008

### 鮮度保持フィルム P-プラス®

#### ■ Film-by-film comparison of water content



#### ■ Comparison of bedewing reduction effects



(Storage temperatures: 10 degrees C/assumption of refrigerated showcase)

(Effects)

- (1) Prevent melting and rotting of mushrooms in the case of store sale
- (2) Curb mold and bud flush at time of exporting sweet potatoes to Southeast Asia

#### (Improvement of packaging)

- Develop anti-bedewing film by combining original blending technology and film multi-layering technology
- Maintain proper temperature inside the package with the film absorbing moisture and releasing it through its outer surface
- Curb respiration of vegetables and fruits by creating micron holes on the film and setting an appropriate amount of oxygen passing through the film depending on their kinds, weights, distribution environments, etc.

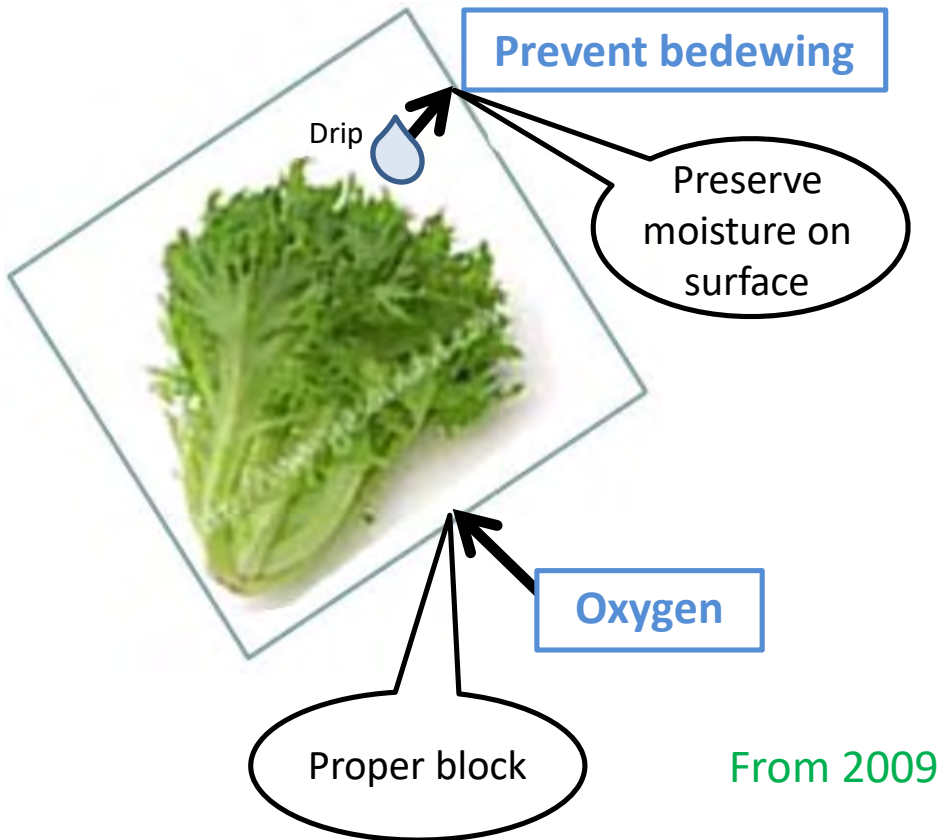


#### (Extend freshness)

- Extend the freshness of vegetables and fruits by curbing their respiration
- Reduction of food waste caused by rotting resulting from bedewing inside the package



### 鮮度保持袋 スパッシュ®

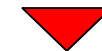


**FY 2015 Grand Prize of Mottainai (regret over waste) for Industrial Waste**  
**Win the Minister of Agriculture, Forestry and Fisheries Award**

### (Improvement of packaging)

- "Spash" (keep-fresh pouch) maintains optimum temperatures for vegetables and fruits through proper barrier effects and prevents their discoloring. It also prevents bedewing and maintains their purity and freshness inside.

|  <b>Store shelf sale (example): Cut lettuce</b><br>(condition: 4th day at storage temperature of 10 degrees C) |                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Standard package                                                                                                                                                                                  |   |
|                                                                                                               |  |
| Noticeable "darkening" and "wilting"                                                                                                                                                              | Limited "darkening" and "wilting"                                                    |



### (Extend freshness)

- Reduce food waste by extending freshness

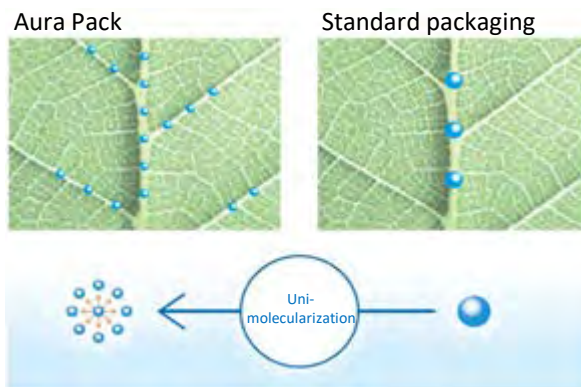
### 鮮度保持袋 オーラパック®

(Number of test days: 3rd day)

Test conditions      Average temperature 22℃      Average humidity 30%RH



↑Curb discoloring and bad smell of broccoli



Aura Pack stimulates water molecules in vegetables and fruits which stagnate after harvesting and preserves their freshness by activating water molecules.

### (Improvement of packaging)

- Special treatment of the film, such as making fine holes, maintains a “low-oxygen and high-carbon dioxide” situation inside the pouch and stimulates the activities of water molecules in vegetables and fruits after harvesting.
- Curb spoiling of vegetables and fruits, caused by water drops inside the pouch, through high anti-dimming nature.



### (Extend freshness)

- Curb discoloring and smell by keeping vegetables and fruits fresh and extend the period of preserving freshness.

Example: Broccoli

Conventional packaging: Extended to 5 days from 3 days

### (Promotion of exports)

- Expected to be used for exports from Japan

From 2008

### フリルレタス、レタスミックス



From February 2016

#### (Improvement of packaging)

- Use of pouch that greatly curbs the evaporation of moisture from vegetables and fruits

#### (Improvements in food production process)

- Production of vegetable (lettuce) inside clean room
- Wrapping in hygiene-controlled, low-temperature cutting room



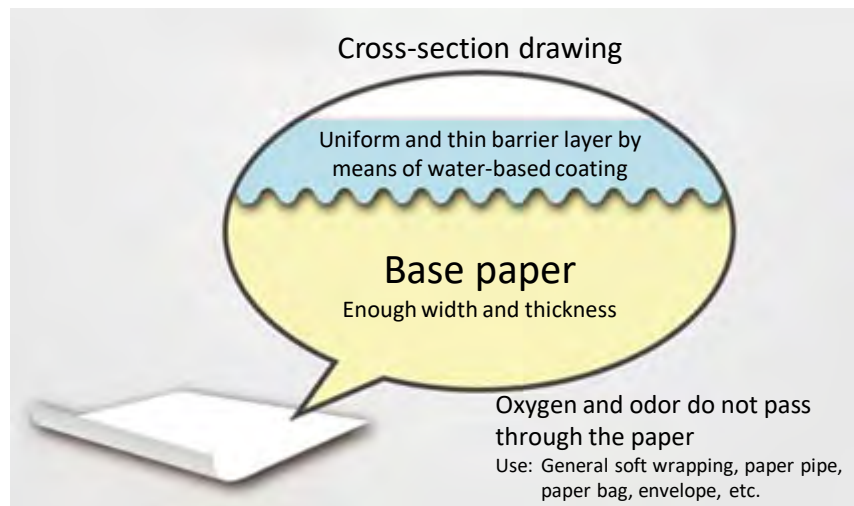
#### (Extend freshness)

- Extend the period of freshness from 2-3 days to 1 week to 10 days through synergy effects of a cut in the number of germs at the manufacturing and wrapping stages and the use of a keep-fresh pouch.

#### (Promotion of exports)

- Exports of vegetables and fruits aboard a ship with refrigerating machinery are possible.

### シールドプラス®



From August 2016

### (Improvement of packaging)

- Develop Shieldplus, which has high barrier properties against oxygen and is capable of maintaining the flavor of contents and preventing the entry of odor, by applying water-based coating to paper
- Applicable as a paper material with various thicknesses, Shieldplus can be processed into wide-ranging applications such as soft wrapping materials, cups, paper dishes, liquid containers, etc.



### (Extend best-before date)

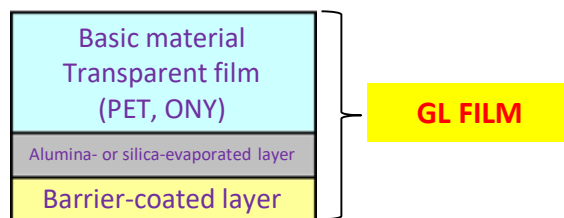
- Barrier properties against oxygen extend best-before date by preventing the oxidation of contents.
- Barrier properties against flavor curb the degradation of flavor



### GL FILM



<Cross-section drawing>



#### (Usage example: Yamaki Co. Katsuo Pack)

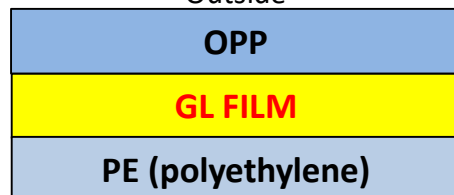


Used as inside package



(Inside package: composition of packaging material)

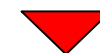
Outside



Inside (facing food)

#### (Improvement of packaging)

- Exercise stale barrier properties by creating inorganically evaporated and coated layers to prevent the passage of oxygen, moisture, etc. inside the film as base material
- Improve preservability by attaching film matching food in addition to high barrier properties



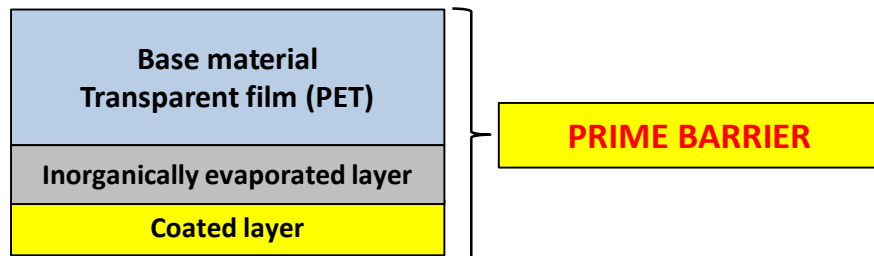
#### (Reduction of food waste)

- Preserve flavor and texture of food at the time of sealing as high flavor-retaining properties, barrier properties against oxygen and moisture-proof properties prevent the dispersal of flavor as well as oxidation and moisture absorption
- Improve user-friendliness by individual wrapping and reduce disposal waste



### PRIME BARRIER <sup>®</sup>

(Cross-section drawing)

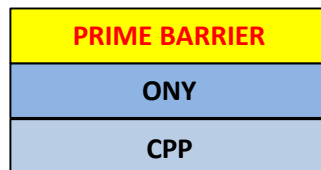


(Usage example: Ichimasa Kamaboko Co. Tamago iri Oden 6 Shu 6 Ko)



(Composition of packaging)

Outside



Inside (facing food)

(Sale) From June 2013

### (Improvement of packaging)

- Develop high-barrier film “Prime Barrier” good for retort food by combining “GL Film” having barrier properties against oxygen and moisture and “Besela” with flex resistance.
- Special treatment has given the film functions to absorb the odor of retort food.



### (Reduction of food waste)

- Long-term preservation at ordinary temperature is possible due to strong resistance to the effects of temperature and humidity.
- High flex resistance curbs disposal waste caused by damage to film.

### お母さん食堂



\* FamilyMart UNY Holdings Co. has renewed its original “sozai” (prepared food) “FamiDelica” as “Mother’s Kitchen,” effective in September 2017.



### (Improvement of packaging)

- Use plastic food containers and upper lid film blocking oxygen
- Remove air from sealed containers and fill them with gases (nitrogen and carbon dioxide) to curb the oxidation of food and the multiplication of germs.



### (Extend best-before date)

- Extend best-before date of “sozai”

From August 2016

### 「ランチパック」シリーズ



From 1984

#### (Improvement of packaging)

- Use a film thinner than usual to fill package with air to maintain the quality of products.

#### (Improvement at food production stage)

- Automated production process prevents human hands from touching products inside.



#### (Reduction of food waste)

- Curb the generation of food waste because air inside the package serves as a cushion against damage during transportation or in households.

#### (Preserve freshness)

- Maintain the safety and quality of product due to packing under hygienic conditions

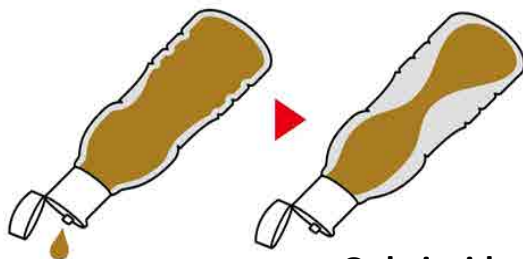
### 香りつづく とろける味噌



**Freshness lasts as long as “miso” (bean paste) is not exposed to air**

**Dual structure bottle**

**Dispenses when squeezed and stops when released**



**Only inside pouch shrinks**

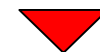
**(Sale) From September 2017**

### (Improvement of packaging)

- Dual structure of the bottle realizes high preservability by preventing the content's exposure to outside air after opening.
- Dispensing amount is adjustable from small to large depending on the strength of squeeze.

### (Ingenuity in production process)

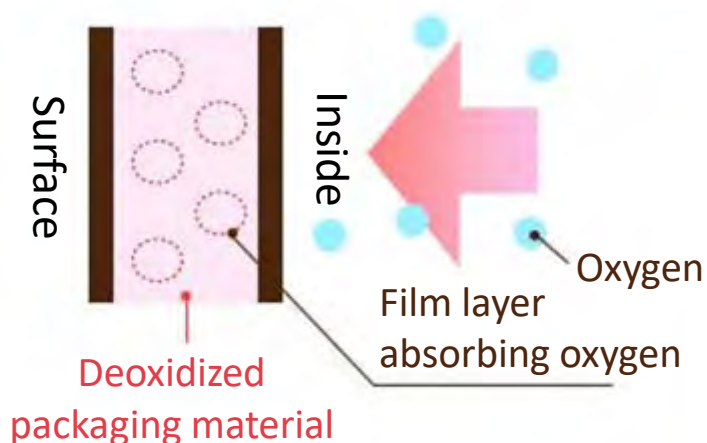
- Improve user-friendliness by liquidizing miso



### (Extend best-before date)

- Preserve freshness for 90 days by curbing the degradation of content by oxidation after opening
- Residual in the bottle is reduced as the content can be dispensed to the last drop by squeezing the bottle.

### 「味の素KKおかゆ®」 白がゆ



(Sale) From 1998

#### (Improvement of packaging)

- Use deoxidized packaging material for the pouch to absorb oxygen from products at the time of production and storage.

#### (Improvement at food production stage)

- Use water from which oxygen was removed at the time of production.



#### (Maintenance of quality)

- Prevent drop in the flavor and quality of products by removing oxygen from them at the time of production and storage.



### 浜焼きシリーズ



(Composition of packaging material)

Hamayaki Hotate

Best-before date:  
Before opening - 180 days  
at ordinary temperature



Outside

**PRIME BARRIER**

ONY

CPP

Inside (facing food)

### (Improvement of packaging)

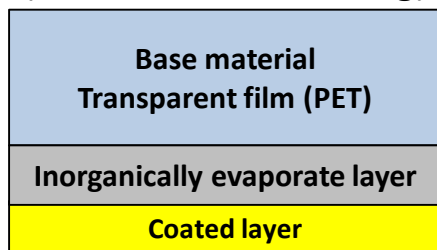
- Adopt packaging material using highly flexible and transparent film Prime Barrier to prevent degradation from crooked part after retort treatment.
- Vacuum packaging of material, as it stands, is possible.



### (Reduction of food waste)

- Long-term preservation at ordinary temperature is possible due to strong resistance to the effects of temperature and humidity (Before opening - 180 days at ordinary temperature)
- High flex resistance curbs disposal waste caused by damage to film.

### (Cross-section drawing)



**PRIME BARRIER** ®

(Production: Toppan Printing Co., Ltd.)

(Sale: From December 2016)

### ぬらすと！抗菌シート

(Comparison photos 6 days later: Circles point to spoiling)

Without sheet



With anti-germ sheet



No discoloring! and slow spoiling! on anti-term sheet

### (Improvement of packaging)

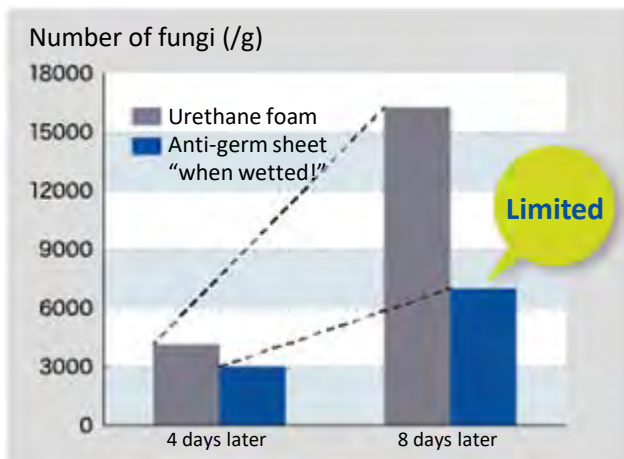
- Develop an anti-germ sheet with addition of powder from burnt scallop shells that alkalifies when exposed to water
- The sheet curbs the growth of germs and absorbs excess moisture and so curbs the discoloring of contents (vegetables, fruits, mushrooms, etc.) and damage to them.



### (Extend freshness)

- Use of the sheet in a package of strawberries slows the start of spoiling for 3 to 6 days
  - Use of the sheet in a package of mushrooms curbs their discoloring and spoiling even 7 days after.
- (\*) Both features are based on test data by the company.

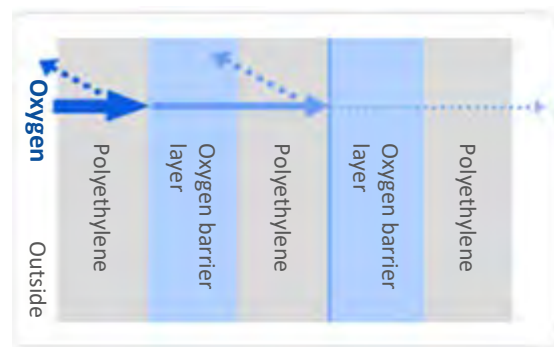
ぬらすと！抗菌シート



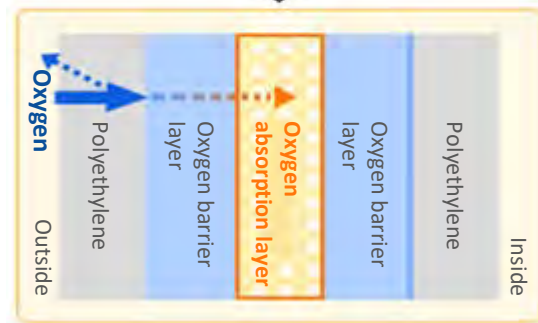
Reproduced from the homepage of Oji Holdings Corp.

(Sale) From April 2017

### キューピーハーフ



Existing multi-layer bottle



Oxygen absorption bottle

### (Improvement of packaging)

- Adopt an “oxygen absorption bottle” of mayonnaise with a multiple-layer structure having high barrier properties against oxygen capable of absorbing even a tiny amount of entered oxygen. The structure has an oxygen absorption layer between oxygen barrier layers.

### (Improvement at food production stage)

- Remove as much oxygen as possible by reviewing the production process and changing the composition of the bottle.



### (Extend best-before date)

- Best-before date has been extended to 12 months from 7 months through the combination of improvements in packaging and the process of production.

納豆「金のつぶ®梅風味黒酢たれ」  
他 1 商品



From March 2016

■ Hinge

Before change



After change



(Improvement of packaging)

- Improve the hermeticity of the tray by eliminating the space and a hole in the lid at the hinge

(Improvements in food production process)

- Adopt a new production method featuring fermentation at temperature higher than usual



(Extend best-before date)

- Best-before date has been extended to 15 days from around 10 days.

(Reduction of food waste)

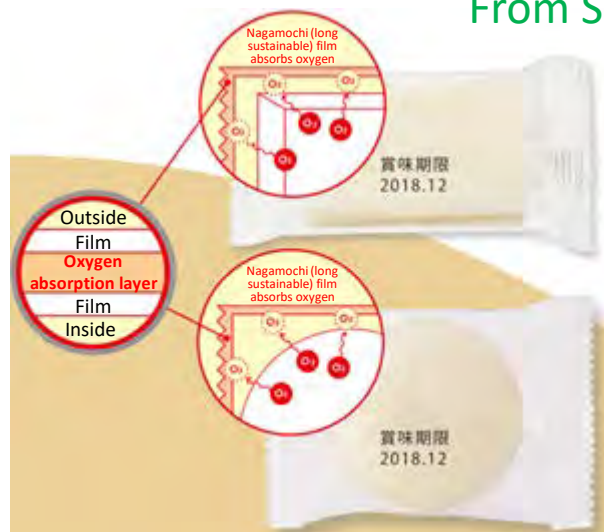
- The new packaging is expected to curb the generation of disposal waste at the production stage or caused by the expiry of best-before dates at households.



### サトウの切り餅、サトウのまる餅



From September 2016



### (Improvement of packaging)

- Adopt a high barrier film, which curbs the evaporation of moisture, for individual packaging of rectangular and round “mochi” (rice cake).
- The film maintains the moisture of the rice cake while absorbing oxygen inside each package and preventing the entry of oxygen from without.



### (Extend best-before date)

- Extend best-before date to 24 months from 15 months by maintaining the texture of freshly pounded rice cake through prevention of its oxidation and maintenance of moisture in it.

### (3Rs, etc.)

- The elimination of the conventional agent to preserve freshness has made waste separation easier for disposal.



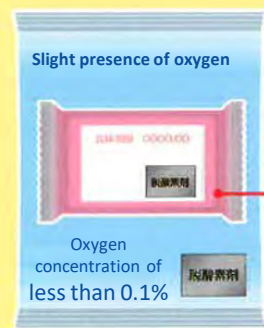
### 越後生一番切り餅



From April 2015

#### Double-barrier packaging

Adopt **double-barrier** method of individual packaging and enclose deoxygenating agent in outside pouch to preserve the taste of freshly made rice cake.



- **Maintain deoxidation state** in inside pouch after opening outside pouch
- Anaerobic state**  
Oxygen concentration of **0%**

#### (Improvement of packaging)

- Adoption of a high oxygen absorption material for individual packaging and attachment of a deoxygenating agent have made it possible to promptly absorb oxygen and curb the oxidation of products immediately after production.
- Print best-before date on each individual package



#### (Extend best-before date)

- Extend best-before date to 24 months from 12 months, combined with review of production process, etc.

#### (Reduction of food waste)

- Print of best-before date on each package reduces disposal waste caused by forgetting best-before date even in the absence of outer package

\*Related example posted on page 50

### 日本のごはん



Whole wrapping with film

From November 2011

Each  
package  
200g



Each package 120  
Equivalent to small cup of  
rice soaked with tea  
Equivalent to one rice ball  
("onigiri")

### (Improvement of packaging)

- Review the conventional composition of aseptic packaging material for rice (tray + upper lid film) and adopt single-material, thin-walled film package while improving preservability
- Cut the amount of content from 200g to 120g for easier consumption



### (Extend best-before date)

- Curb oxidation by deoxygenating agent and realize 1-year best-before date for aseptically packaged rice (excluding disaster supply-type, etc.)

### (Reduction of food waste)

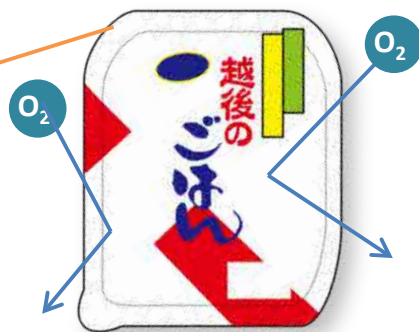
- Reduce leftovers by cutting the amount of each package to 120g for adequate consumption

### 越後のごはん



From September 2015

Use film with high barrier properties against oxygen



### (Improvement of packaging)

- Use film with high barrier properties against oxygen as cover of cooked rice container



### (Extend best-before date)

- Extend best-before date to 300 days from 210 days

### ふんわり名人 甘酒仕立て



From January 2016



### (Improvement of packaging)

- Aluminum-evaporated film, with higher barrier properties against oxygen than before, used for outside and inside packaging blocks oxygen and light.



### (Extend best-before date)

- Extend best-before date for standard products, whose best-before date is 120 days as in the case of ordinary rice-based snacks, to 180 days
- Use of aluminum-evaporated film prevents the oxidation of products and preserves their flavor



### 輸出用 ふんわり名人 きなこ餅、チーズもち



From June 2012



### (Improvement of packaging)

- Use of packaging material with high barrier properties against oxygen in barrier layer of outside film prevents oxidation of products



### (Extend best-before date)

- Greatly extend best-before date to 300 days, compared with 120 days for products for domestic market

### (Promotion of exports)

- Extend best-before date to 300 days for exports, considering time needed for customs clearance procedures, etc.

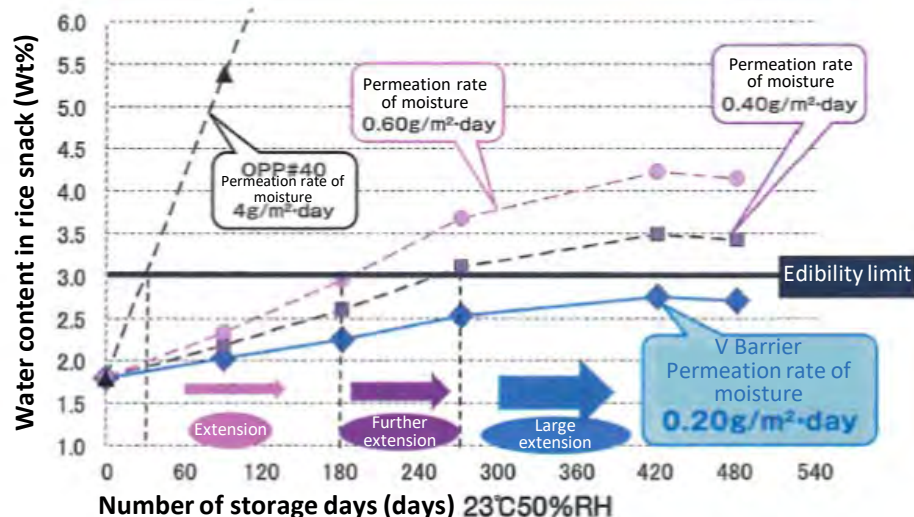
### 品質保持フィルム Vバリア®



Usage examples: Rice-based snack (left) and cookie (right)

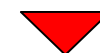
From July 2016

Test on actual packaging and storing of rice snack (prevention of dampening)



### (Improvement of packaging)

- V Barrier is a packaging film with high moisture-proof properties and barrier properties against oxygen. Anti-oxygen barrier properties do not drop even under high temperature.
- High barrier properties preserve the flavor of food products and prevent them from absorbing smells from other food products.



### (Extend best-before date)

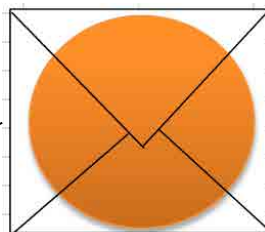
- Prevention of rice snacks, cookies and other dried food products from being dampened, preservation of freshness of unbaked cake and others with relatively high water contents and long-term maintenance of oxidation preventing effects

### 「里見の郷」、「月餅」、「チョコまん」、 「桃山」、「栗まん」

#### Image of conventional product:

Product was wrapped with plastic material, as shown in the image, without deoxygenating agent.

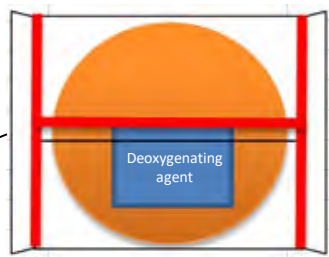
PP (polypropylene)



#### Image of product after improvement:

Inclusion of deoxygenating agent and use of gas-barrier wrapping material with higher hermeticity (sections in red glued with heat)

Barrier PP (polypropylene)  
PE (polyethylene)



#### Usage example:



From June 2011

#### (Improvement of packaging)

- Adoption of high gas-barrier wrapping material and deoxygenating agent



#### (Extend best-before date)

- Shift to a gas-barrier wrapping material with high hermeticity and use of a deoxygenating agent, etc., has achieved the maintenance of product quality and extended the best-before date to 45 days from 10 days.

### 5個入り焼き菓子パック



From June 2011

#### (Improvement of packaging)

- While an alcohol-evaporated agent used to be included in the outside wrapping material for the maintenance of quality, the new method enhances the hermeticity of each package and encloses a deoxygenating agent.



#### (Extend best-before date)

- Extend best-before date to 45 days from 30 days

#### (Reduction of food waste)

- Enclosure of a deoxygenating agent in each package makes it possible to maintain quality after opening and reduce food waste at households.

### スティックチーズ（PB品）



From August 2016

#### (Improvement of packaging)

- Change the quality of material in film used for casing
  - Rise in sealing quality raises yield in filling and packaging processes
  - Improvement in gas barrier properties against oxygen
  - Improvement in detachability of film
- Reduction of food waste caused by defective packaging



#### (Extend best-before date)

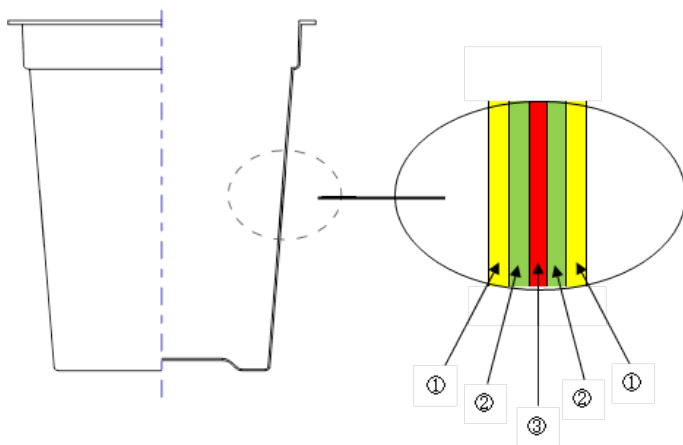
- Extend best-before date to 9 months from 6 months by improving gas barrier properties

#### (Reduction of food waste)

- Drop in food residual due to improved detachability



### カフェラテ240ml



**Drawing:**  
**Composition of cup**

- ① Virgin layer
- ② Middle layers  
(recycled waste material from cups)
- ③ Anti-oxygen barrier layer

(From February 1993)

### (Improvement of packaging)

- Use of oxygen barrier layer between middle layers of cup
- Recycle material wasted in production of cups for use as middle layer for efficient resource utilization

### (Improvement at food production stage)

- Sterilize content and cup separately and fill under germ-free conditions



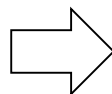
### (Extend best-before date)

- Maintain the flavor of content by blocking the passage of oxygen and curbing its degradation via oxidation. Adoption of germ-free filling realizes a 70-day best-before date, compared with the best-before date (of 1 to 2 weeks) for standard chilled beverages.

明治メイバランスMiniカップシリーズ



Conventional product



From May 2015

(Improvement of packaging)

- Shift from paper package to plastic cup
- Improvement in the physical strength of container reduces deformation and damage at distribution and storage stages.



(Extend best-before date)

- Extend best-before date to 12 months from 9 months

## スマデリバッグ®



From February 2014

### (Improvement of packaging)

- Use of transparent barrier film (GL Film) realizes long-term, normal-temperature storing and the non-use of aluminum makes direct heating in a microwave oven possible.
- Automatic passage of vapor lets vapor out slowly, enabling steamed and boiled meals without using fire.



### (Extend best-before date)

- Transparent barrier film useable in microwave oven and having high barrier rate. Extension of best-before date, compared with conventional product, is possible.

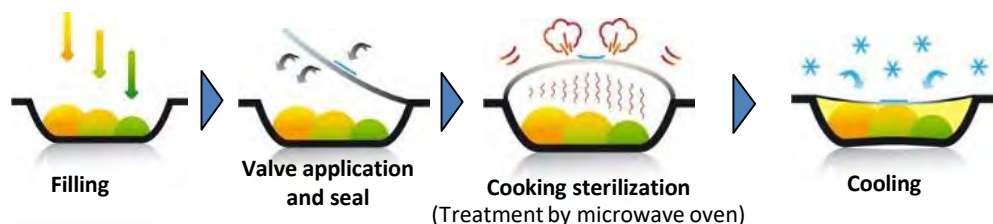
### (Shorten cooking time)

- Unlike existing retort products, the addition of ingredients creates a hand-made sentiment. Time is saved for individual diet and cooking.

### DNPチルドレディミール包装システム Micvac



From October 2012



#### (Improvement of packaging)

- 1st introduction in Japan of food production system combining the use of special valve and heating by microwave oven.
- Quick heat sterilization and de-airing packaging are possible.



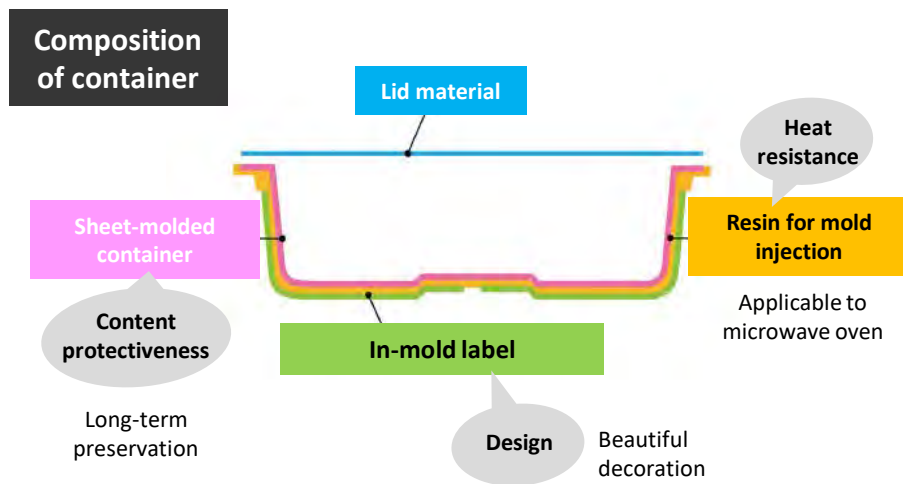
#### (Extend best-before date)

- Setting best-before date of more than 1 month (47 days) is possible for chilled products  
(1 to 2 days for overnight sozai)

### DNPインモールドラベル容器 ビューベル スクエアタイプ°



Scheduled for around September 2017



#### (Improvement of packaging)

- Adoption of a multi-layer sheet, including oxygen-barrier and oxygen-absorption layers and processed into an integrated product modeled by mold injection, as a food container. An in-mold label, with an attractive design, is integrated into its exterior.



#### (Extend best-before date)

- Ensure 3-year preservation by combining oxygen barrier and oxygen absorption functions of sheet-molded container

#### (Improvement of user-friendliness)

- Plastic container with no metal used can be used in microwave oven
- Usable as a dish because of an attractive design

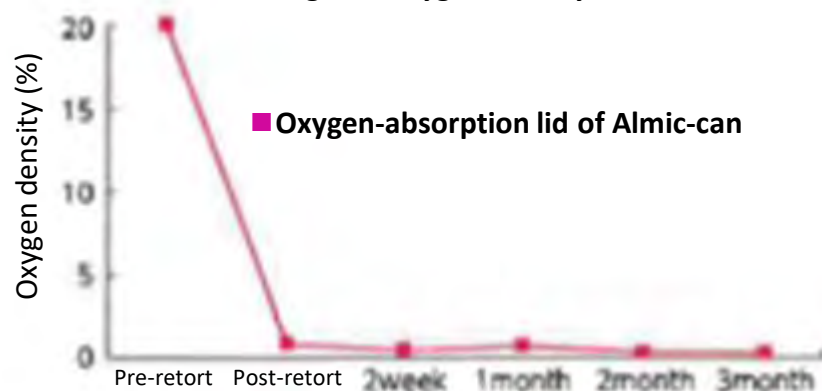


### アルミック缶®



From February 1993

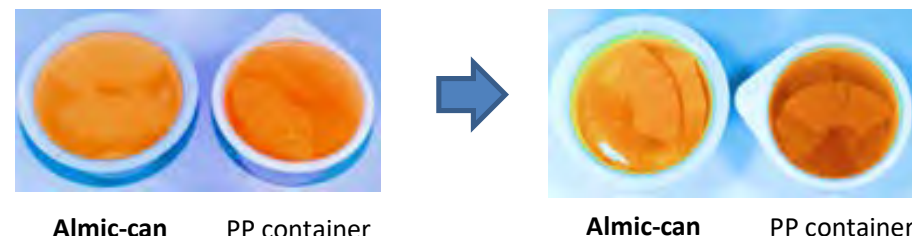
Changes in oxygen density



### (Improvement of packaging)

- Almic-can is a container using a laminate material combining aluminum foil and film. While capable of greatly reducing the concentration of oxygen, the container, after being filled with food, is applicable to boiling sterilization and retort sterilization.

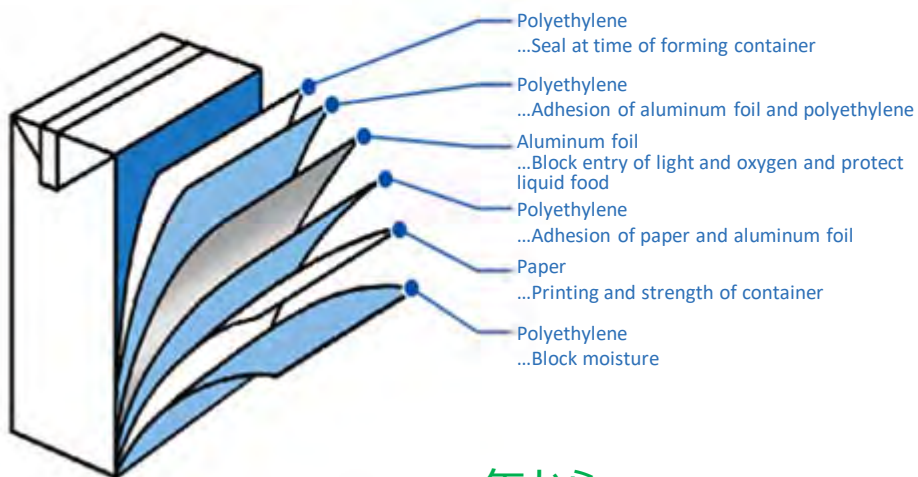
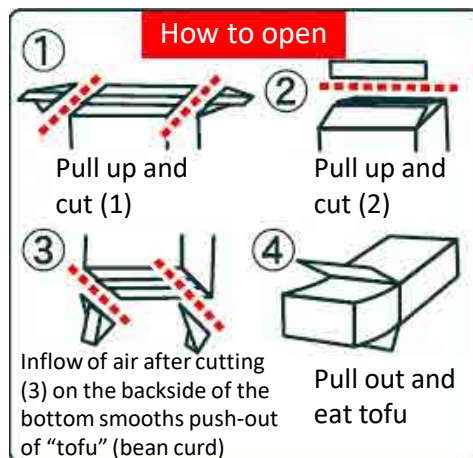
Changes in color of fruit-containing jelly after 3-month preservation



### (Extend best-before date)

- Reduce food waste by greatly extending best-before date

### 森永絹ごし豆腐



1989年から

#### (Improvement of packaging)

- While tofu is usually placed in a plastic container, a paper container, with attached aluminum foil to block oxygen and light, has been adopted to enhance barrier properties.

#### (Improvement at food production stage)

- Applying the long-life production method, contents and containers are separately sterilized and filling is made under germ-free conditions.



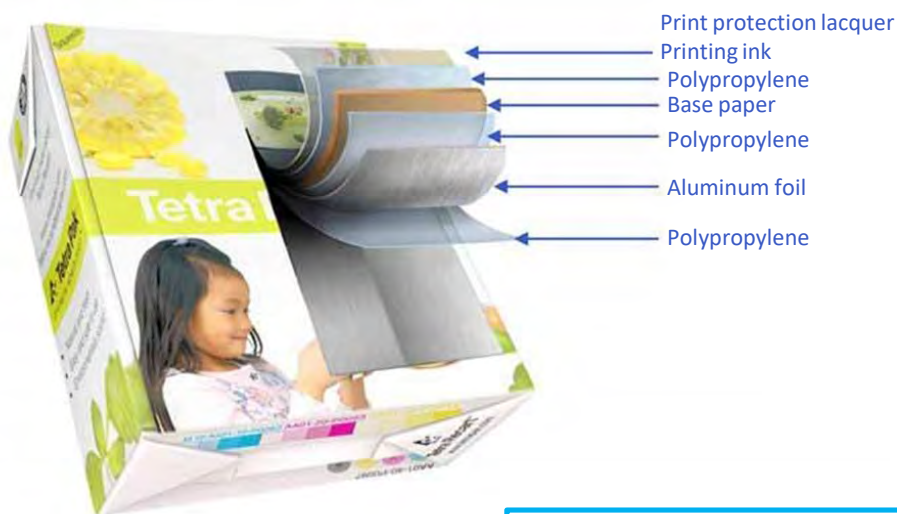
#### (Extend best-before date)

- Realize 10-month best-before date, compared with conventional best-before date for tofu (approx. 1 week).
- Reduce food waste at distribution stage and in households by extending best-before date for tofu whose demand tends to be affected by weather conditions.

#### (Promotion of exports)

- Export approx. 530 tons to some 30 countries, including those in the Middle East and Asia as well as Australia and South Africa, per year.

### テトラ・リカルト



Space saving

Easy opening and pouring  
by hand



No bulky treatment after use



### (Improvement of packaging)

- The container, though paper, can be used as a food container like a glass bottle, can, retort pouch, etc. and is applicable to heat treatment and retort treatment.
- Paper container certified by FSC \*



### (Extend best-before date)

- Paper container for food capable of preservation at normal temperature (for about 2 years\*)

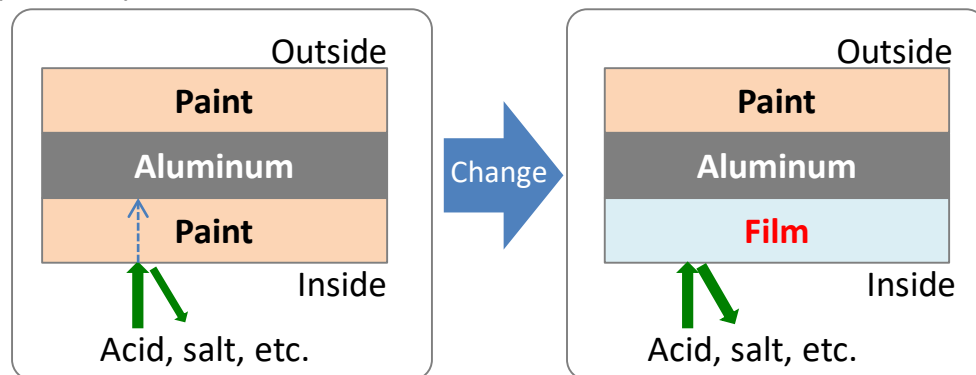
\*Best-before date differs depending on food it holds.

\*The FSC (Forest Stewardship Council) is an international organization that certifies forests throughout the world and the distribution and processing processes of products lumbered from them. It is a mechanism to support the world's forests by purchasing products carrying the FSA label.

野菜一日これ一本 長期保存用 190g



(Can lid)



From February 2015

(Improvement of packaging)

- Select a can body and lid having a highly corrosion-resistant polyester film attached inside (Polyester film is more resistant to corrosion than paint applied to the conventional can).

(Improvement at food production stage)

- Select and use vegetables for changes in flavor despite long preservation



(Extend best-before date)

- Improved resistance to corrosion has extended the best-before date to 5 years 6 months from 5 years.



### レンジでごちそう！ビーフシチュー、 グリルチキン、粗挽き肉団子



### (Improvement of packaging)

- Adopt film with high barrier properties against oxygen to prevent oxidation of content
- Adopt film, which is readily tearable horizontally, for pouch that contains product inside so that content can melt and be taken out easily.
- Adopt heat-resistant foam tray which is suitable for heating in microwave oven and can be used as dish after heating because it does not become too hot.



### (Extend best-before date)

- While the freshness of dishes cooked overnight usually expires in a few days, a best-before date of 3 months at normal temperatures has been set thanks to high barrier properties.

(Sale) From 2017



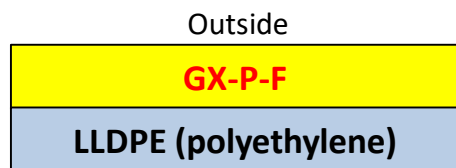
### 白い恋人

Individual package

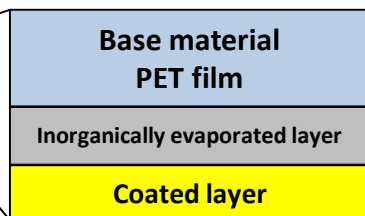


(Sale) From May 2017

(Composition of individual package)



(Cross-section drawing of GX-P-F)



### (Improvement of packaging)

- Barrier film GL Film, used for individual packaging, has been replaced with high-end GX-P-F to secure higher barrier properties against oxygen, moisture, etc.



### (Extend best-before date)

- Improved barrier properties make it possible to maintain the flavor of freshly made products for a long time and extend the best-before date to 6 months from 4 months.

#### GL FILM

GL Film is a transparent barrier film developed by Toppan Printing Co. and exercises high barrier properties against oxygen, moisture, etc. due to the lamination of inorganically evaporated and coated layers on its base film.

**GX-P-F** is a transparent high barrier film graded as an alternative to aluminum foil.

甘酒 4 袋入・おしるこ 4 袋入  
(フリーズドライ)



(Improvement of packaging)

- Select material that blocks moisture, oxygen, etc. for inside pouch
- Improve adhesive strength of film in heat-adhered section
- Stabilize sealing by reviewing heat-seal temperature and pressure



(Extend best-before date)

- Blocking moisture, oxygen, etc., together with improving the hermeticity of the container, extends the best-before date to 24 months from 12 months.

From August 2017

### ウィダーinゼリー エネルギーイン



#### (Improvement of packaging)

- Select material (AL foil LLDPE) that blocks moisture, oxygen, etc. for pouch
- Improve the hermeticity of the opening and closing part by improving the shape of the cap and straw.
- Improve shock resistance by improving strong film while making the entire pouch thinner

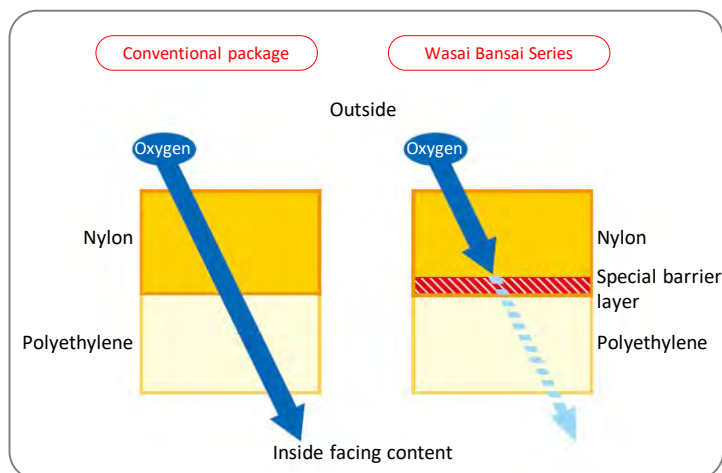
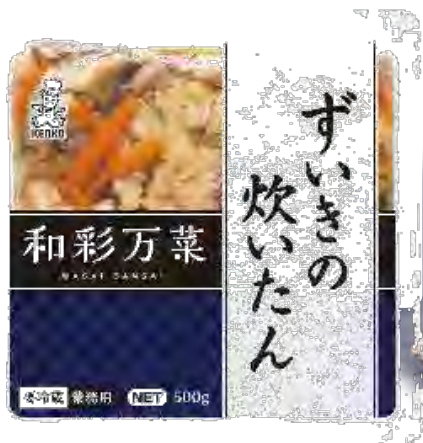


#### (Extend best-before date)

- Blocking moisture, oxygen, etc., together with improving the hermeticity of the container, extends the best-before date to 12 months from 10 months

From March 2014

### 「和彩万菜®」シリーズ



From October 2014

#### (Improvement of packaging)

- Use of packaging material, with high barrier properties against oxygen, curbs changes in the flavor and color of products

#### (Change of content volume)

- Change the volume of products for commercial use to 500g from 1kg



#### (Extend best-before date)

- Curbing oxidation extends (doubles) the best-before date to 90 days from 45 days for conventional Chilled Long Life Wasozai

#### (Reduction of food waste for offering at stores)

- Cut in the volume of packaging reduces leftovers and contributes to reduction of food waste after opening.



### レスキューフーズ 白いごはん

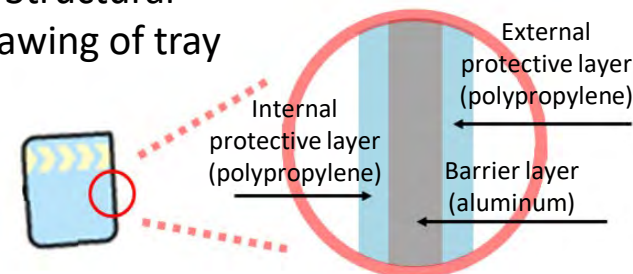


(Renewal) From autumn of 2017

#### (Improvement of packaging)

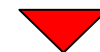
- Replace plastic tray for rice with aluminum hybrid tray to block oxygen and light
- Adopt material for protective layer of tray to prevent odor from transferring to rice

Structural drawing of tray



#### (Improvement at food production stage)

- Develop original rice cooking method and improve quality of rice, fresh after steaming



#### (Extend best-before date)

- Extends the best-before date to 5 years and 6 months from 3 years and 6 months by blocking oxygen and light

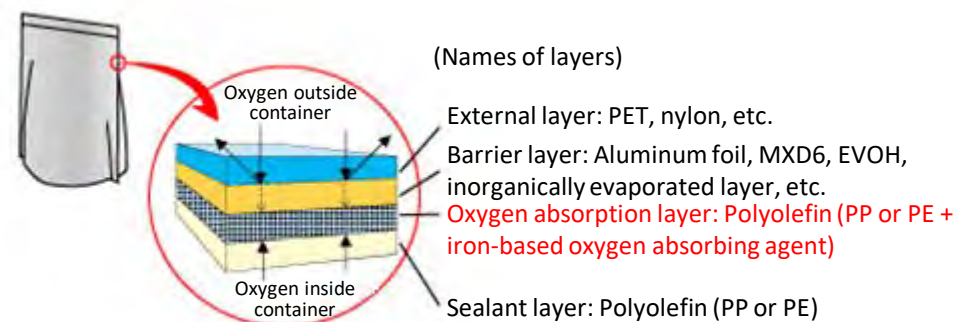
### レスキューフーズ ビーフカレー



(Renewal) From autumn of 2017

#### (Improvement of packaging)

- Shift from ordinary aluminum pouch to functional high barrier aluminum with oxygen absorbing layer



#### (Improvement at food production stage)

- Improve beef curry cooking method to adopt specifications suitable for long-term preservation



#### (Extend best-before date)

- Curbing oxidation extends the best-before date to 5 years and 6 months from 3 years and 6 months.

### ダイアミロン<sup>®</sup> MF CAタイプ



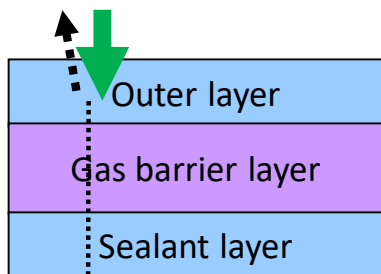
(Usage example: Dispenpak)

### (Improvement of packaging)

- The conventional product uses a multi-layer sheet with high barrier properties against oxygen and curbs the passage of oxygen from outside into the container. But it permits a tiny amount of oxygen to pass through.
- Develop, therefore, the “Diamiron<sup>®</sup> MF CA Type” by adding a resin layer capable of absorbing oxygen.

### ◇Add oxygen absorption layer to oxygen barrier layer

O<sub>2</sub> from outside

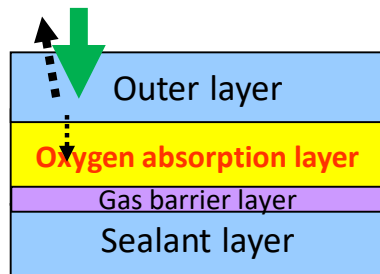


(Facing content)

Absorb oxygen from outside to further curb the passage of oxygen

(Sale) From February 2011

O<sub>2</sub> from outside



(Facing content)

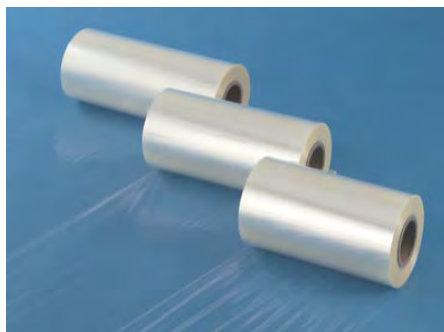
### (Extend best-before date)

- Realize a best-before date of 12 months by curbing the passage of oxygen, compared with a best-before date of 4-8 months achieved by the conventional gas barrier wrapping method.



透明蒸着バリアフィルム  
**テックバリア®**

バリアナイロンフィルム  
**スーパーニール®**



Transparent evaporated barrier film "Techbarrier"

Oxygen from outside

**Barrier nylon (Supernyl®)**

Sealant layer

**Transparent evaporated nylon  
(Techbarrier®)**

Sealant layer

Slight passage  
of oxygen

Facing content

Enlarged drawing

Exterior packaging

Individually  
packaged

By courtesy of Echigo Seika Co. Ltd.

- Curb the oxidation of content by inhibiting the passage of oxygen with 2 barrier films
- Enclose deoxygenating agent in each individual package

### (Improvement of packaging)

- Use multilayer film "Supernyl®" with enhanced barrier properties against oxygen as exterior packaging
  - Adopt transparent evaporated nylon film "Techbarrier®," with stronger barrier properties against oxygen and barrier properties against moisture, for each individual package
- (\*Thickness of films is unchanged out of concern about environment load)
- Curb oxidation by individual package after opening exterior package



### (Extend best-before date)

- Extend the best-before date for rectangular rice cake to 24 months from the normal 12 months by curbing oxidation
- Use of resilient nylon film curbs food waste caused by package breach

(Sale) From April 2015 \*Related example posted on Page 24



### インブレムHG

Immediately after  
disinfection treatment      Preservation  
for 1 month      Preservation  
for 3 months

インブレム  
HG



Curbing of  
discoloring

Conventional  
product



Content: Bamboo shoots treated in water



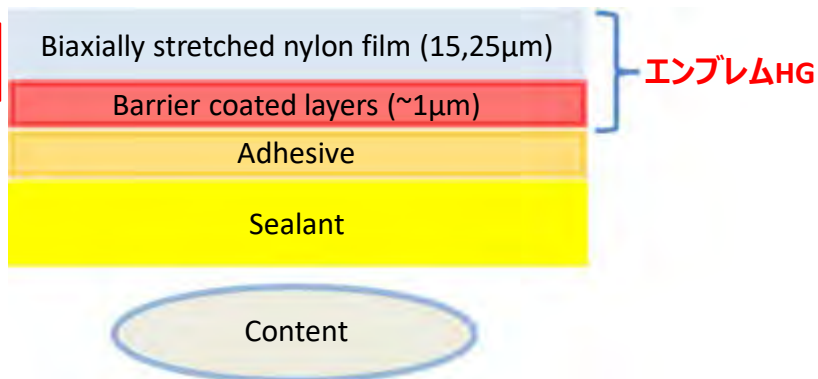
### (Improvement of packaging)

- Flexible barrier layer created in nylon film maintains the quality of content by retaining effective barrier properties against oxygen even after boiling and retort treatment.

### (Extend best-before date)

- High barrier properties against oxygen have improved the function of maintaining the quality of content. Best-before date for commercial-use sozai has been extended to 12 months from 6 months.
- Strong effects of curbing discoloring reduce disposal waste resulting from discoloring, etc.

Composition  
of film



(Sale) From January 2015

## 鍋キューブ®



Individual packaging

From August 2012

## (Improvement of packaging)

- Develop cubic ingredient for hot-pot soup and individually package for consumption per person (1 cube)

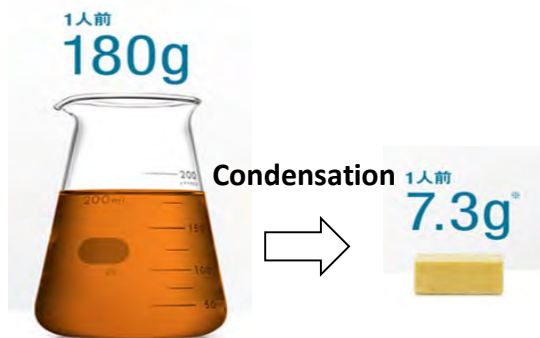
## (Improvement at food production stage)

- Develop original blending and manufacturing technologies for solidification into cubes and easy melting in cooking



## (Reduction of food waste)

- As each cube is for consumption per person, the amount of cooking is adjustable from 1 person to many people, making it possible to reduce household food waste caused by leftovers.



\*Weight of each Nabe Cube® (Tori Dashi/Umarshio)

## シーチキンマヨネーズタイプ しょうゆ風味 40g



From March 2015

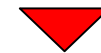
(Reference: 70g of canned tuna and 50g of canned tuna mixed with mayonnaise)

### (Improvement of packaging)

- Quadrisect 40g of content and adopt package for 10g each for use as ingredient for “onigiri” rice balls\*  
(10g and 15g for school lunches)

### (Improvements in food production process)

- Improvements in the production process were made to filling equipment, wrapping film, contents for filling, etc. in the production process in accordance with packaging features.



### (Eat alone and reduce food waste)

- Quadrisect enables small-amount cooking, such as use for each “onigiri,” and so reduces waste.

これは便利® ロースハム、ロース生ハム、  
ベーコン、パンチエッタ



## (Improvement of packaging)

- Use fun-size package consisting of 4 slices or so each
- Cut weight of package by approx. 7%, compared with hollow package of sliced hams



## (Reduction of food waste)

- Change to a fun-size number of slices reduces the possibility of leftovers and so cuts back on household waste after opening.

From 2004



明治北海道十勝ポーノ  
切り出し生チーズシリーズ

From March 2011



## (Improvement of packaging)

- Process gouda cheese, mozzarella cheese, cheddar cheese, etc. into 10g sticks and adopt fun-size package for each of them.



## (Reduction of food waste)

- Processing into user-friendly amount and size facilitates full consumption and reduces food waste.

## ミニチーズセット



From 2012



Contents of set

### (Improvement of packaging)

- Adopt films with different permeabilities of oxygen in accordance with kinds of natural cheese
- Containers with anti-oxygen barrier properties, deoxygenating agencies and inert gas replacement are often used for natural cheese to curb the generation of molds, etc.
- Brie cheese, ripened by white molds, loses its product value in the distribution process if its maturation is hampered in an anaerobic state created by sealing.



### (Extend best-before date)

- Extend best-before dates to three weeks to 1.5 months from conventional 1 week to 1 month depending on types of cheese.

### (Reduction of food waste)

- Reduce food waste by cutting various kinds of cheese into small sizes

## おかき煎等



From October 2013

- ◎ Aluminum evaporated packaging is effective in the adhesiveness of aluminum and light insulation.

Film printed inside OPP material is pasted with film having aluminum evaporated to CPP material. Thickness is 20u.

## (Improvement of packaging)

- Reduce cracks, etc. on softly fried products by individually packaging them.
- Use of aluminum-evaporated film prevents the degradation of product quality



## (Reduction of disposal waste)

- Prevent degradation of product quality
- Individual packaging reduces disposal waste caused by cracks, etc. during production and distribution processes.

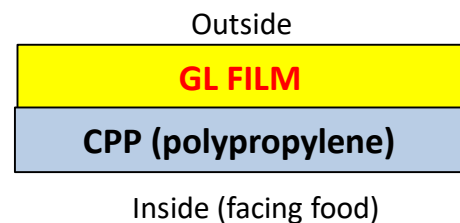
## ココナッツサブレ



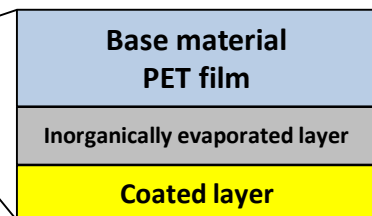
Individual packaging

(Sale) From October 2016

(Composition of individual package)



(Cross-section drawing)



### (Improvement of packaging)

- Change to package of 5 fun-size pieces on occasion of renewal sale
- Adopt “GL Film” with high barrier properties



### (Reduction of food waste)

- Small-lot packaging improves preservability after opening.
- Packaging material with high anti-oxygen barrier properties and moisture proof properties reduces food waste caused by the degradation of product quality by preventing oxidation and moisture absorption.

GL FILM is a transparent barrier film developed by Toppan Printing Co. adding an inorganically evaporated layer and coated layer to its base film. GL Film exercises high barrier properties against oxygen, moisture, etc.



## 朝のフレッシュ®ロースハム、 ロースハム塩分25%カット



### (Improvement of packaging)

- Use fun-size package for sliced hams
- Adopt thinned film with high barrier properties against oxygen to reduce the used amount of packaging material by approx. 20% (starting in 2017)
- The mouth for opening has been enlarged to 30mm in size from 23mm for easier opening. Emboss processing was also applied for easier grasping.



### (Reduction of food waste)

- Household food waste through leftovers is reduced by making small fun-size packages label-connectable

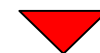
(Sale) From 1997

\*From March 2017 for Morning Fresh® Loin Ham Salt Content 25% Cut

## チキンナゲット 便利なジッパー付き

## (Improvement of packaging)

- Adopt zipper to reseal chicken nugget package
- Curb drops in the texture and quality of chicken nuggets after opening as the package can be resealed for cold storage after taking out necessary number of nuggets



## (Reduction of food waste)

- Reduce household food waste due to full use

(Sale) From 2017

## 「食べきりサイズに対応した製品」

Product examples



## (Improvement of packaging)

- The number of slices has been adjusted in response to changes in family configuration such as an increase in single-person households and a decrease in family members per household.
- Packages have been downsized to match a drop in the number of slices in each.

### (Reference)

Ratio of single-person households (from 21% in 1990 to 27% in 2015)

Number of family members per household (from 3.1 in 1990 to 2.38 in 2015)



## (Conveniently sized and individually packaged)

- Reduce out-of-date products (food waste) by introducing fun-size packages such as 3 slices of bread per package or a cut in the number of table rolls to 3 from 5 or 6.



## 「Cook Do®」2人前シリーズ



(Sale) From March 2013

## (Improvement of packaging)

- Create new series for 2 persons in addition to family series for 4 persons



## (Reduction of food waste)

- Lineup of series for a number of family members per household reduces food waste by decreasing leftovers resulting from excess cooking.



### 特選 生わさび



Developed product



Conventional product

### (Improvement of packaging)

- Mouth of the tube has been changed to facilitate the squeeze-out of content until all is used up.



### (Reduction of food waste)

- Reduce food waste as easy design for full use until the last of content ("wasabi" Japanese horseradish) is used, leaving none inside.

From September 2015

## ビヒダス ヨーグルト（4連タイプ）

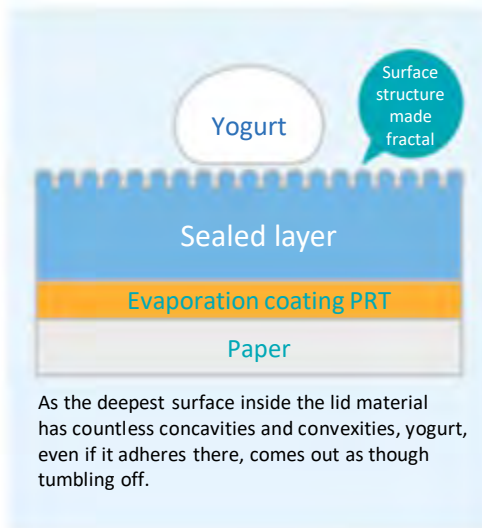


From May 2012

Surface of lotus leaf and its SEM structure

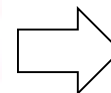


Asperity structured with fine villi



### (Improvement of packaging)

- Adoption of a packaging material, which has water-shedding properties achieved by the application of the surface structure of lotus leaf, makes yoghurt and the package more detachable.



### (Reduction of food waste)

- Reduce residual in the package as yoghurt does not attach to its lid at the time of opening

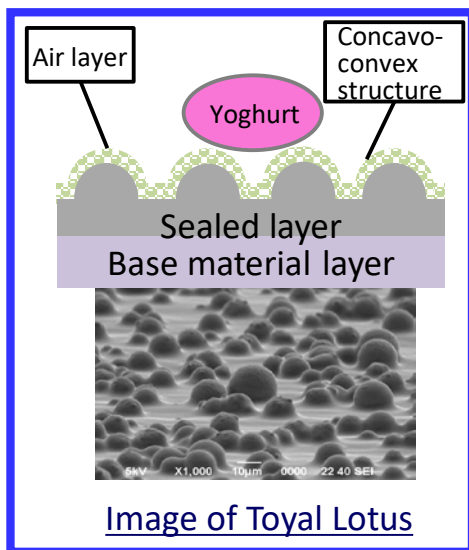
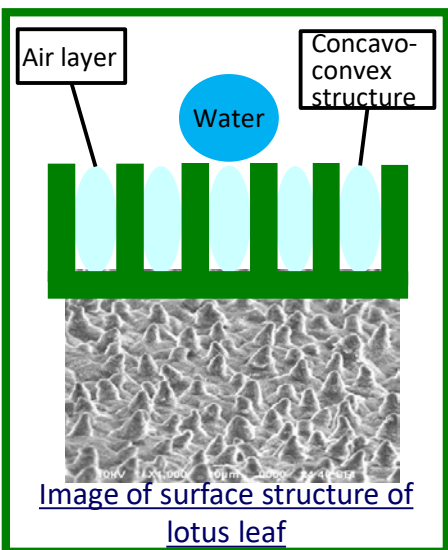
### (3Rs, etc.)

- Save time for washing the lid for waste separation after eating

## ナチュレ 恵 megumi ブルーベリー＋いちご 70g×4



From September 2015



### (Improvement of packaging)

- Adoption of a packaging material, which has water-shedding properties achieved by the application of the surface structure of lotus leaf, in the upper lid makes yoghurt and the package more detachable.



### (Reduction of food waste)

- Reduce residual in the package as yoghurt does not attach to its lid at the time of opening

### (3Rs, etc.)

- Save time for washing the lid for waste separation after eating

### デコレーションケーキ



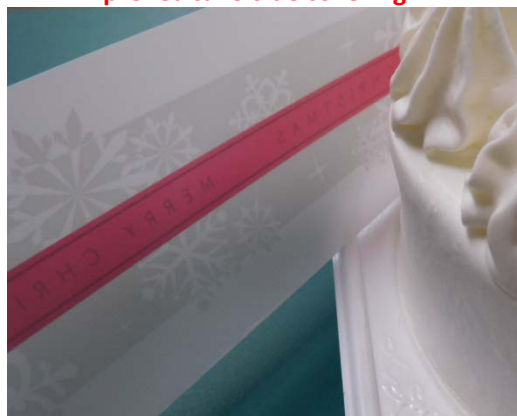
(Sale) From 2016



Conventional cake-side covering film



Improved cake-side covering film



### (Improvement of packaging)

- The conventional side covering film takes a considerable amount of cream away from a decoration cake when it is peeled off.
- To address the problem, the improved covering film is given water- and oil-shedding properties, achieved by the application of the surface structure of lotus leaf, so that cream stays better on the cake.

○Image of film (image of reduced scale)

Oil-shedding treatment (Toyal Ultralotus®\*)

Special coating

Plastic film

\*Production: Toyo Aluminum KK



### (Reduction of food waste)

- Food waste is reduced as cream stays on a cake for consumption without waste.

**Win the Minister of Economy, Trade and Industry  
Prize as the 2017 Japan Packaging Contest**



### 「ふわふわスフレ」シリーズ



#### (Improvement of packaging)

- The conventional packaging has an embossed film inside to prevent souffle from adhering to the pouch. The improved packaging uses a specially coated film inside the pouch.



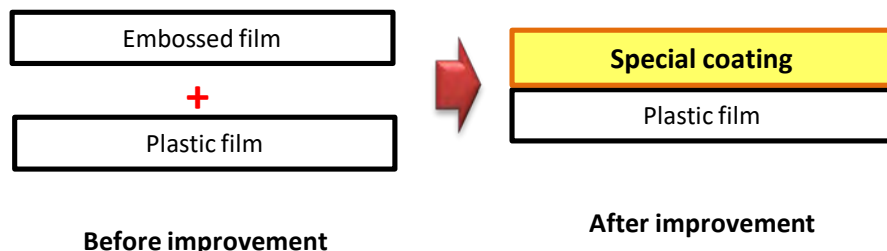
#### (Reduction of food waste)

- Food waste is reduced as the prevention of souffle from attaching to the pouch has enabled consumption without waste.

#### (3Rs, etc.)

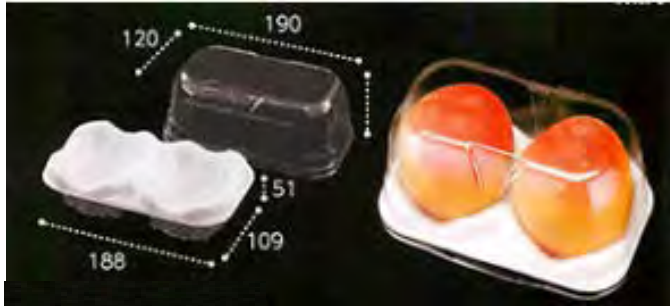
- Dual packaging is no longer necessary due to the prevention of souffle from attaching to the pouch without using an embossed film.

○Image of packaging (image of reduced scale)



(Sale) from 2016

### ふわりーと

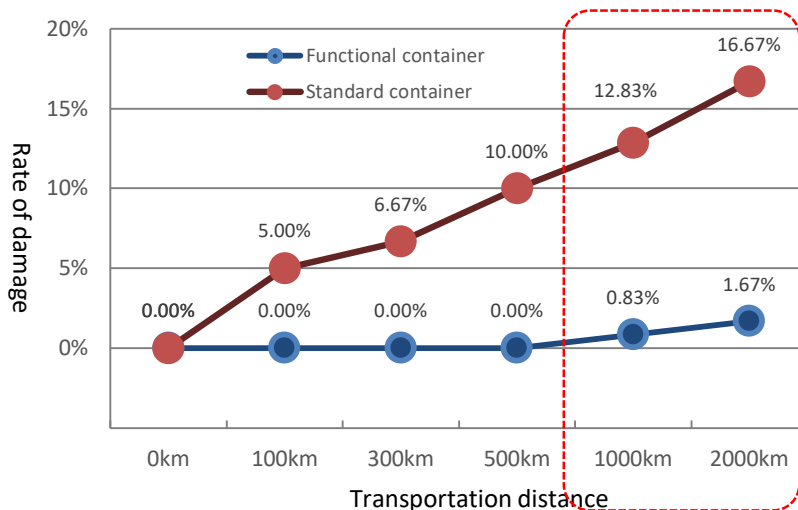


From August 1999

### (Improvement of packaging)

- Functional container to reduce damage to vegetables and fruits during transportation
- Consists of unwoven fabric (polyester) to wrap peaches and molded-bottom container

### ■ Rate of damage by distance during transportation of peaches



Source: LCA Research and Study Report on Plastic Food Containers (March 2016 by the Plastic Waste Management Institute)

### (Curb damage to peaches)

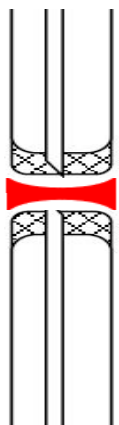
- Elasticity of unwoven fabric curbs damage to vegetables and fruits from shaking and shocks caused by transportation and freight handling.
- The fabric is expected to be used for exports from Japan as it is suitable for long-distance transportation.



### アミノバイタル® GOLD



From October 2016



A specially shaped mold in the cutting section of filling and packaging equipment cuts and rounds off the angle of a part shown in the left drawing.



### (Improvement of packaging)

- Individually packaged sticks used to be wrapped with a material having sharp angles and damaged during transportation, etc. as they bumped into each other.

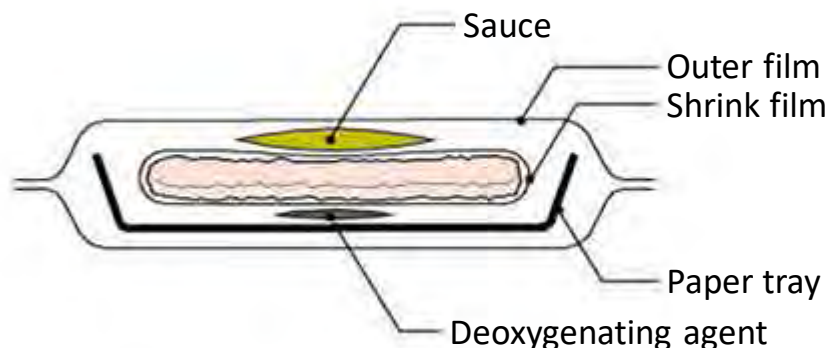
→ Production lines were improved to round off the angles.



### (Reduction of food waste)

- Reduction of food waste is achieved by alleviating mutual piercing by sticks.

### ラ・ピッツァ



### (Improvement of packaging)

- Package consists of a shrink film wrapping pizza dough, sauce and toppings, a paper tray that protects the entire product, a deoxygenating agent, and an outer film having gas barrier properties.



### (Reduction of food waste)

- Optimizing the makeup of packaging reduces damage during transportation and cuts back on disposal waste caused by cracks and scattering of toppings at the distribution stage.
- Curbing oxidation realizes a best-before date of around 2 weeks.
- Cut in the volume of waste is possible as the paper tray can be folded into a small piece for discarding.

(Sale) From 2003



### 「ほんだし®」300g、450g、600g箱



(Conventional product)

Outside

|               |
|---------------|
| Plastic film  |
| Aluminum foil |
| Inside film   |

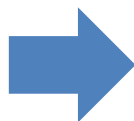
Inside (facing food)

(Improved product)

Outside

|                             |
|-----------------------------|
| Plastic film                |
| Aluminum foil               |
| Internal high-strength film |

Inside (facing food)



### (Improvement of packaging)

- Using a plastic film, the pouch occasionally developed small holes due to shaking during transportation.
  - The use of a high-strength film in place of the plastic film prevents the pouch from developing holes during transportation.
- (\*Thickness of films is unchanged out of concern about environment load)



### (Reduction of food waste)

- Reduce disposal waste by cutting back on disposal and product returns caused by holes created during transportation.

(Sale) From August 2014

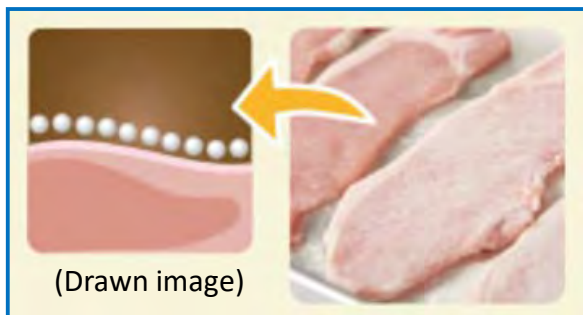
### 日清 クッキング フラワー®



From 2015



Applicable to mince!



Evenly floured on ingredient



Good for pouring!

### (Improvement at food production stage)

- Granulate flour with original method.  
Develop flour that avoids clumping

### (Improvement of packaging)

- Enhance user-friendliness by downsizing from 1kg bag to 150g bottle
- Use of refillable product contributes to cut in the volume of packaging material used.



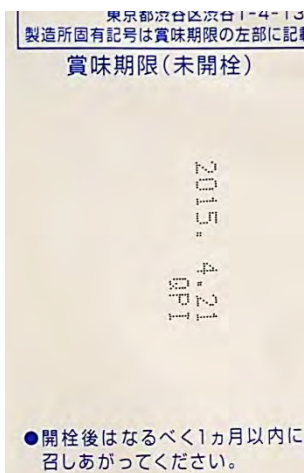
### (Reduction of food waste)

- Granulation helps flour avoid clumping and be evenly covered over ingredients. Food waste can be reduced as the small bottle is easy to use and fully consumed without waste.

### キューピーマヨネーズ、キューピーハーフ

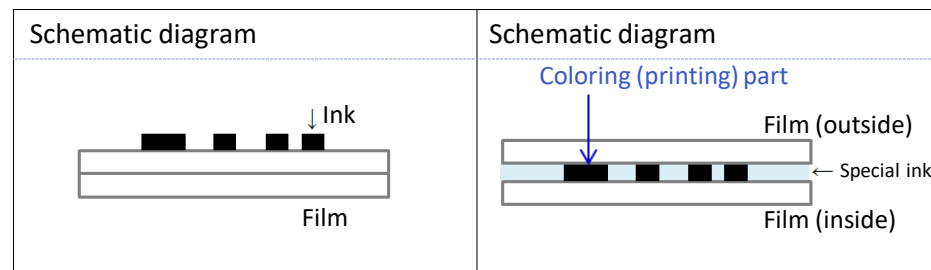


From March 2013



### (Improvement of packaging)

- Make characters to show best-before date and other information, printed on outer film, easier to read



- The print does not fade even if touched during distribution
- Printed in higher density after selection of outer film and optimum setting of ink's adhesion strength



### (Reduction of food waste)

- Higher visibility of the print reduces disposal in households caused by false recognition of best-before dates.

# (株) ロッテ

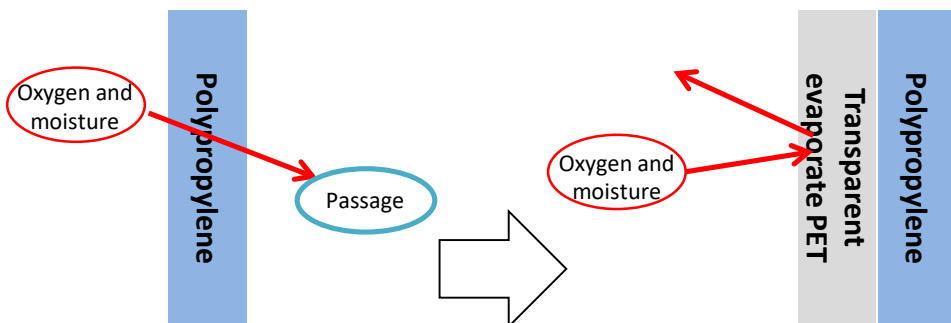
## スイーツデイズ 乳酸菌ショコラ アーモンドチョコレート・ビター



### Composition of outer film

#### Conventional

#### After improvement



From February 2016

## Others

### (Improvement of packaging)

- Adopt outer film having strong barrier properties against oxygen and moisture

This product is often displayed close to yoghurt and other chilled products because of its name and character. The conventional packaging material often deteriorated the quality of contents due to bedewing, etc. and damaged outer cases, resulting in product returns and disposal.

### (Reduction of food waste)

- Improved outer film curbs the degradation of quality and makes it possible to display and store the product under various conditions of temperature and humidity.



### ニューコンミート



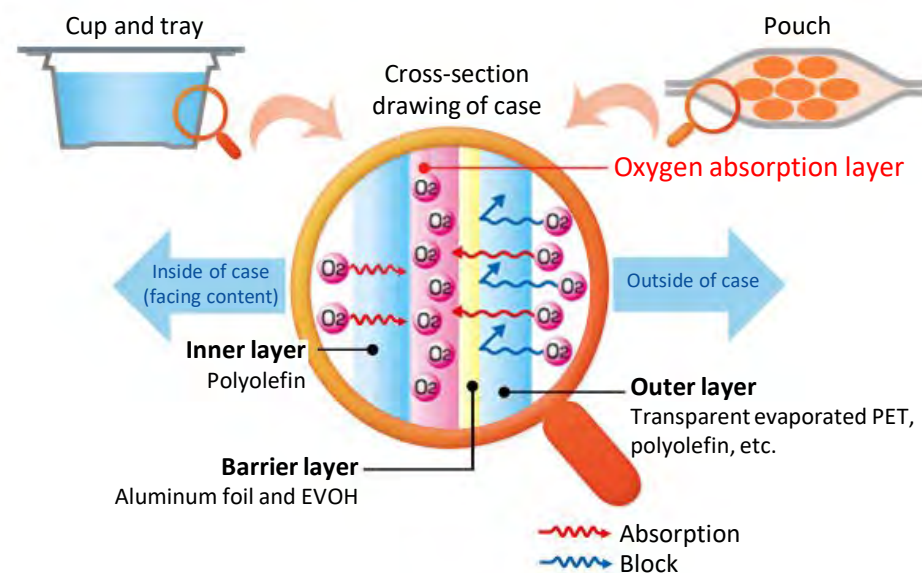
(Compared with metal can)

- While the metal could cause injuries because of sharp edges created during opening, the risk is reduced thanks to the adoption of a plastic case
- User-friendliness is enhanced thanks to easy opening

(Sale) From 2012

### (Improvement of packaging)

- Adopt a functional special plastic case that has an oxygen absorption layer and to a great extent limits the generation of moisture and a film with high barrier properties.



### (Long-term preservation)

- Prevent oxidation of content and retain the same best-before date as the conventional metal can (3 years at ordinary temperature)



### 「ほんだし®」120 g 箱



#### (Conventional product)

Outside

|                     |
|---------------------|
| Paper               |
| Aluminum foil, etc. |
| Inside film         |

Outside (facing food)

#### (Improved product)

Outside

|                     |
|---------------------|
| Paper               |
| Aluminum foil, etc. |
| PET film            |
| Inside film         |

Outside (facing food)

(Sale) from September 2015

### (Improvement of packaging)

- The paper pouch tended to tear and unexpectedly developed small holes if a user held a part, with fingers, under which there were granules, to pull out the pouch from the box.
- Adopt a PET film to make the pouch resistant to sticking pressure



### (Reduction of food waste)

- In the case where a hole or holes are discovered before opening, the product may be discarded out of concern about possible effects on the content. Disposal waste is reduced by making the pouch resistant to sticking pressure created when it is pulled out.