1. RTD Market in Japan

2. History and Product Features of Hyoketsu®

3. Technological Innovation for Hyoketsu®
   : Initiatives to Intensify Natural Fruit Flavor
1. RTD Market in Japan
What is RTD in Japan?

RTD is acronym for “Ready To Drink“

RTD in Japan is generally
- pre-mixed packaged drink <10% alcohol.
- composed of fruit juice and some ingredients.

Fruit juice
Spirits
Saccharides
Acidulants
Flavorings
How was RTD born in Japan?

- RTD originated shortly after the end of WWII.
- Casual Japanese-style bars of Tokyo began serving shochu neutral spirits mixed with carbonated water.

In 1945

Japanese-style bars

Chu-hi

- lower price
- drinkable

Named *shochu highball*, which after called “Chu-hi.”

In 1984

“TaKaRa can Chu-hi” was first launched in Japan
The growing category has changed **every 10 years**. Entering the 2000s, RTD sales showed a marked increase.

In 2014, 8 million hL/year

Quoted from Beer makers association, liquor makers association (partly estimated by Kirin)
Why is RTD growing in Japan? -Flavors-

- Various fruit flavors and alcohol content of RTD correspond to differentiation in consumer tastes.
- More than 120 new products launched every year, making Japanese RTD market one of the most competitive in the world.
Why is RTD growing in Japan? –Price–

- Nominal retail price of RTD is 67% of that of beer.
- Liquor tax of RTD is 33% of that of beer.

Nominal retail prices at major convenience stores, 350ml can

(including 8% consumption tax)

(Unit: AUD)

<table>
<thead>
<tr>
<th></th>
<th>Beer</th>
<th>Chu-hi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>2.70</td>
<td>1.80</td>
</tr>
<tr>
<td>Liquor Tax</td>
<td>0.90</td>
<td>0.30</td>
</tr>
</tbody>
</table>

(84 JPY/AUD)

Quoted from Kirin Data Book 2014 on page 5
The RTD market shows continued expansion in the future as manufacturers meet the expectations of consumers.

RTD in Japan is generally
✓ pre-mixed packaged drink <10% alcohol.
✓ composed of fruit juice and some ingredients.

RTD sales reached up to 8 million hL in 2014.

The reason for growing Japanese RTD market
✓ Various RTD correspond to differentiation in consumer tastes
✓ Low nominal retail price and liquor tax
2. History and Product Features of Hyoketsu®
Weren’t consumers satisfied?

- high alcohol sensation and targeted towards middle-aged men.
- Women and younger people prefer “drinkable” or “refreshing taste”.

Gaps between existing RTD in those days and the overall category image

Survey by Kirin Brewery Co., Ltd (n=300, July 1999)
What is Hyoketsu® different for?

- In 2001, Kirin innovated chu-hi in those days, changed every characteristics.

<table>
<thead>
<tr>
<th>Target</th>
<th>Women and younger people (20-30’s)</th>
</tr>
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<tbody>
<tr>
<td>Flavor</td>
<td>Bring out original flavor of fresh fruit juice</td>
</tr>
<tr>
<td></td>
<td>Easy to drink with clear and refreshing taste</td>
</tr>
<tr>
<td>Package</td>
<td>Modern and sophisticated</td>
</tr>
<tr>
<td></td>
<td>Embossed with diamond-cut patterns</td>
</tr>
</tbody>
</table>

Hyoketsu® means iced and frozen in Japanese.
Hyoketsu® impact on RTD sales in Japan

- contributed to significant growth in 2001.
- has been No.1 brand since 2001.

Total RTD sales volume in Japan

In 2001 Hyoketsu® launched

RTD top five brand sales volume in 2014

(Quoted from survey by Kirin Brewery Co., Ltd (estimate by Japan liquor makers association))

(Quoted from liquor news No.1868 (2015))
Three core characteristics

1. Frozen clear straight juice
2. Clear vodka
3. Diamond-cut cans
Juice for widely available RTD

Minimum volume by heat treatment and vacuum concentration, so transport efficiently

Concentrated juice process

1. Harvest
2. Extraction
3. Heated and Vacuum concentration
4. Transport efficiently with minimum volume
5. Addition of water

Widely available RTD
Frozen clear straight juice for Hyoketsu®

Clarified and frozen shortly after extraction without extra heat

Frozen clear straight juice process

1. Harvest
2. Extraction
3. Clarified and Frozen without excess heat
4. Transport frozen
5. Unfrozen without extra heat
Volatile component of frozen clear straight juice

About 3–4 times much volatile components than heated.

Decrease in fruit juice volatiles due to heat treatment

Extracted lemon juice was either frozen at -80°C (left) or heated to 70°C for 20 min (right). The lemon juice solution was then extracted with dichloromethane and analyzed by gas chromatography-mass spectrometry (GC-MS).

Remain more fresher flavor compounds than concentrated.
The diamond-cut can

As soon as cans are opened, embossed pattern protrudes, emitting a sound like crushed ice in glasses due to lost of positive pressure.

Before and after opening the diamond-cut can *

*Developed by Toyo Seikan Co., Ltd,
Hyoketsu® has been expanded!

**Standard**
- ✔ Various fruit juice flavor

**Strong**
- ✔ No saccharides
- ✔ No purine bodies

**ZERO**
- ✔ No saccharides
- ✔ No purine bodies
- ✔ No artificial sweetener

**Seasonal**
- ✔ Japanese fruit

**Frozen in pouch**
Coming soon!

- Enter into the new category, premium RTD market.
- Premium with twice higher percentage of high-quality fruit juice

Very fresh and rich fruit sensation!
**Summary**

*Hyoketsu® with three core characteristics has been offering consumers how to enjoy RTD.*

- In 2001, Kirin innovated chu-hi in those days and expanded RTD market in Japan.
- Frozen clear straight juice remains more fresher flavor compounds than concentrated juice.
- Hyoketsu® has been expanded corresponding to differentiation in consumer tastes.
3. Technological Innovation for Hyoketsu®: Initiatives to Intensify Natural Fruit Flavor
How have we improved flavors?

- Optimized the compositions of the major flavor compounds that comprise the fruit flavors. Hyoketsu® realized the fresh, fruit juice sensation and refreshing taste.

I show you a part of the innovation, using Hyoketsu® Lemon and Grapefruit as examples.

**Ingredients**
- Fruit juice
- Spirits
- Saccharides
- Acidulants
- Flavorings

**Flavor compounds**
- esters
- aldehydes
- terpenoids
- flavonoids
- organic acids
- amino acids

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Analytical method

1. Volatile component analysis by HS-GC/MS
2. Taste component analysis by DART-MS
3. Preference survey

1. comprehensively analyze volatile components and various aroma
2. directly ionize samples, and analyze taste components
3. target for 130 people (65 men and women each) aged 25–44 years who regularly consumed RTD at home

① HS-GC/MS

② DART*-MS (*Direct Analysis in Real Time)
Increased linalool and nonanal approximately 1.2-1.5 times in order to intensify fresh aroma.

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<tr>
<th>#</th>
<th>Volatile</th>
<th>Relative value (innovated/current)</th>
<th>Characteristics of component</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Linalool</td>
<td>1.45×</td>
<td>Brilliant aroma, citrus-like</td>
</tr>
<tr>
<td>2</td>
<td>Nonanal</td>
<td>1.23×</td>
<td>Oily citrus-like</td>
</tr>
</tbody>
</table>

**HS-GC/MS analysis before and after innovation**

Instrument: Shimadzu model GCMS-QP2010 equipped with headspace sampler HS-20 Trap
Column: DB-624
**Result ① Volatile Component Design (Grapefruit)**

Increased decanal approximately three times in order to intensify fresh aroma.

### Characteristics of Component

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<tr>
<td>①</td>
<td>Decanal</td>
<td>2.69×</td>
<td>Fresh citrus aroma</td>
</tr>
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**HS-GC/MS analysis before and after innovation**

Instrument: Shimadzu model GCMS-QP2010 equipped with headspace sampler HS-20 Trap
Column: DB-624
The major peak correlates with amount of flavonoids, particularly naringin.

Increased this peak almost twice in order to intensify grapefruit peel taste.

**Result 2: Taste Component Design (Grapefruit)**

- **DART-MS analysis of product before and after innovation**
  - **Instrument:** Bruker model micrOTOF-QIII equipped with IonSense model DART-SVP and Biochromato model ionRocket
  - **MS mode:** positive
The innovated product scored compared to the current,
- higher on “juicy,” “exhilarating feeling,” and “fresh”
- lower on “unpleasant peculiar taste” and “sloppy”
The technologies developed for the Hyoketsu® innovation in 2016 effectively intensify the natural fruit flavors and taste of lemon and grapefruit.

In order to intensify fresh flavor and taste,
✓ Increased linalool and nonanal in lemon.
✓ Increased decanal and naringin in grapefruit.

✓ The innovated product scored higher on “juicy,” “exhilarating feeling,” and “fresh” than the current.
In the future

In Japanese competitive RTD market, we have made an effort to offer various consumers attractive RTDs through deeply understanding of fruit juice.

We were, are and will be a leading company of Japanese RTD market.

If you have an opportunity to visit Japan, I’d like you to drink not only beers but also RTDs!
Thank you for listening!

KIRIN