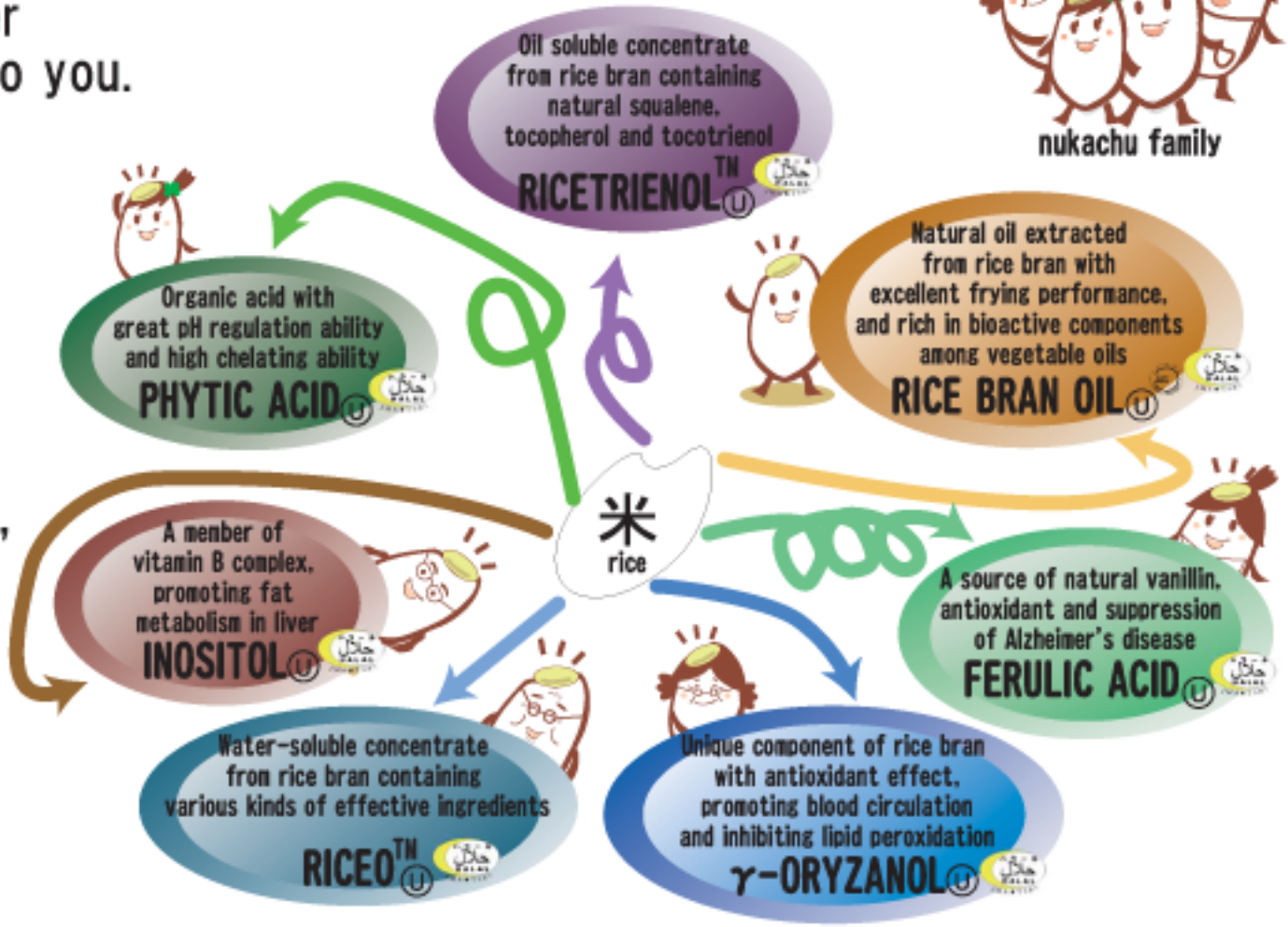

Untiring Research Efforts on Rice Bran for 21st Century
CONNECTED VIA
PharmaCompass.com
CONNECTED VIA
Pioneering for the Gift of Rice
TSUNO
http://www.tsuno.co.jp

Rice creates a prosperous future for you

At Tsuno group, we strive to deliver
the limitless benefits of Rice bran to you.
The unparalleled quality and safety
of our products are at the heart
of our research and development.

Developed and manufactured
at Tsuno group in Japan,
top quality products derived
from rice bran ranging from rice oil,
functional food ingredients,
food additives,
to cosmetics/pharmaceutical
raw materials are trusted
by consumers around the world
for more than 60 years.



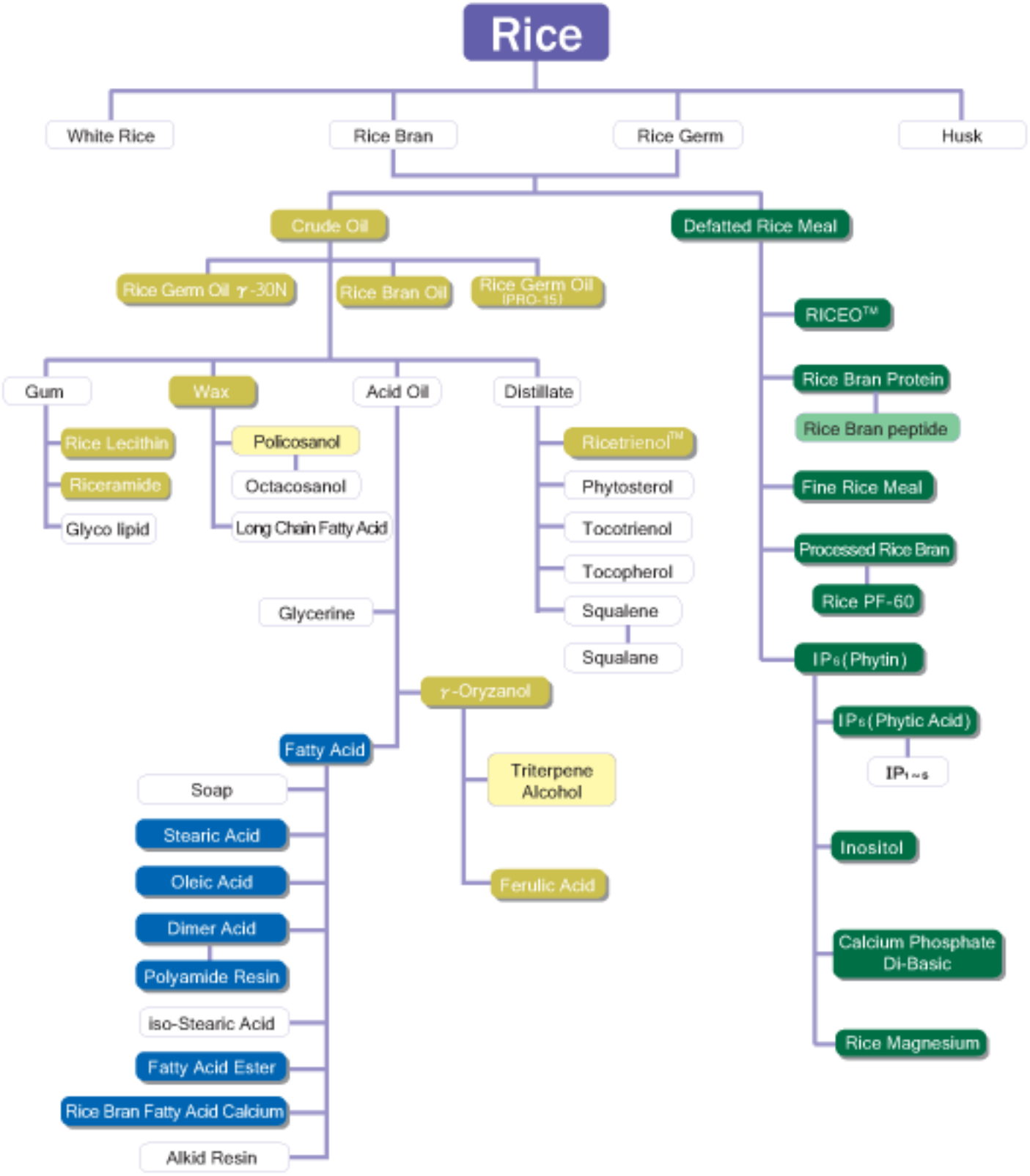
TSUNO

Tsuno Food Industrial Co., Ltd.
Tsuno Rice Fine Chemicals Co., Ltd.
Tsuno Transportation Co., Ltd.
Chikumasa-kumi Corp.

94 Shinden, Katsuragi-cho, Ito-gun, Wakayama, 649-7194 JAPAN
Tel: +81-(0)736-22-8000 Fax: +81-(0)736-22-8060

E-mail tsuno@tsuno.co.jp http://www.tsuno.co.jp

Rice bran: Limitless potentials



*Our Quality Management System and Environmental Management System are registered as conforming to the standards of ISO9001 and ISO14001 respectively.

Pioneering for the Gift of Rice
TSUNO
http://www.tsuno.co.jp

Eb_1208_01

Riceutical™

TSUNO Rice Bran Oil PRO-15 (Rice Germ Oil)

- Rich taste
- Plain flavor
- Stable against heat and oxidation
- Richest in unsaponifiables having health benefit such as γ-Oryzanol, phytosterol, vitamin E and tocotrienol

TSUNO Rice Germ Oil γ-30

- Natural vegetable oil
- Rich taste
- Rich in oryzanol, 20 times more than normal rice germ oil

TSUNO RBP (Rice Bran Protein)

- Cholesterol lowering effect
- Well-balanced amino acid composition

TSUNO Rice Magnesium

- Magnesium extracted from plant origin, innovated by Tsuno
- Equivalent magnesium supplementation quality as that of other sources

TSUNO Ferulic Acid

- Antioxidant
- Prevention of decoloration
- Anti-bacterial action
- Inhibition of "browning reaction" in heated foods
- Alzheimer's disease healing effect

Riceterol Esters

- Reduce LDL cholesterol
- Excellent emulsifier

Riceramide

- Natural ceramide extracted from rice bran

TSUNO Inositol

- Vitamin B like substance
- Essential for infants
- Good for health; metabolic syndrome improvement, fatty liver improvement

RICEO™

- Water soluble concentrate powder from rice bran
- Rich in important nutrients such as minerals and dietary fiber
- Helps stabilize vitamin C and exhibits antioxidant effect

TSUNO Phytic Acid (IP_6)

- Strong chelating agent
- Detoxification effect of heavy metals
- Antioxidant (prevention iron-copper induced oxidation)
- Anti-bacterial action
- Excellent pH adjuster

Pioneering for the Gift of Rice

TSUNO

http://www.tsuno.co.jp

WAKAYAMA JAPAN

TSUNO

Pioneering for the Gift of Rice

Based on cultivated technology and system with sustained efforts, our products to the world. Hoping new tomorrow harmonizing with nature.

Kosher

HALAL

Japanese Good Manufacturing Practice(GMP)

Japanese Agricultural Standard (JAS)

ISO9001

ISO14001

Riceutical™ Products

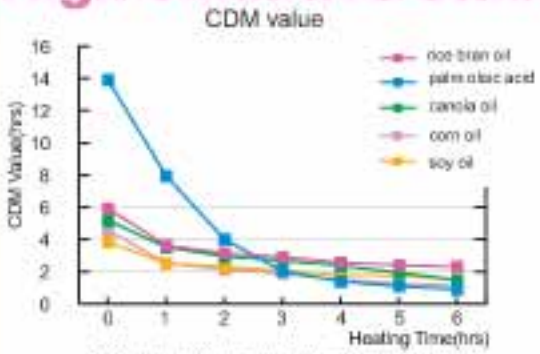
TSUNO

Rice Bran Oil・PRO-15

Rice Bran Oil and Rice Germ Oil (PRO-15) are healthy oils containing rich nutrients from rice

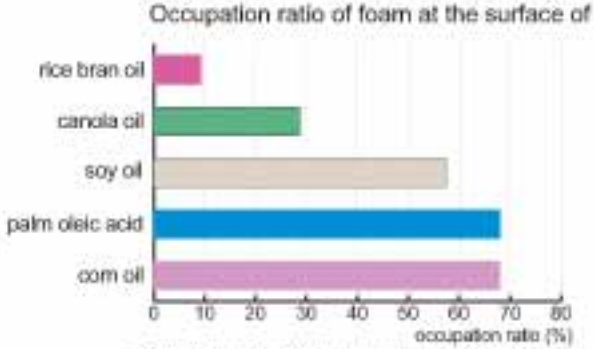
- Contain γ-oryzanol, phytosterol, vitamin E, and tocotrienol
- Preserve original taste of food with pleasant odor and taste

High oxidative stability



CDM values of various plant oils under a cloud of spray of a certain amount of water at 180 ℃ for 6 hours.

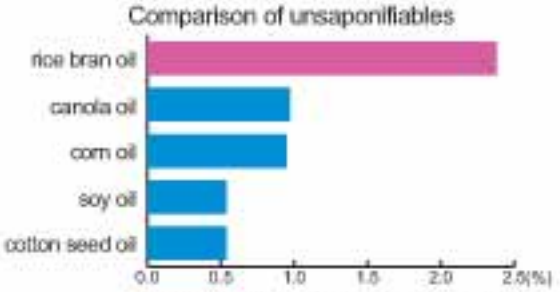
Tsuno R & D dept.



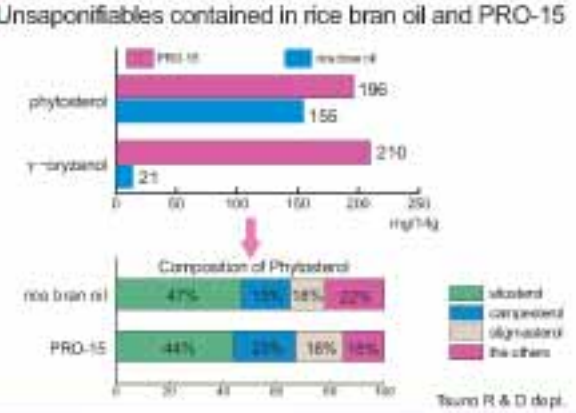
Occupation ratios (%) of foam at the surface of plant oils, when the cubes 5 mm on a side of potatoes were thrown in the oils at 180 ℃ after 20hours.

Tsuno R & D dept.

Rich in unsaponifiables

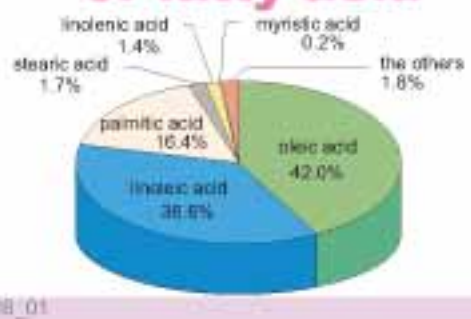


Japan Institute of Oils and Fat, Inspection Foundation
JAS grading report of edible plant oil and fat in 2008



Tsuno R & D dept.

Balanced composition of fatty acid



http://www.tsuno.co.jp

Riceutical™ Products

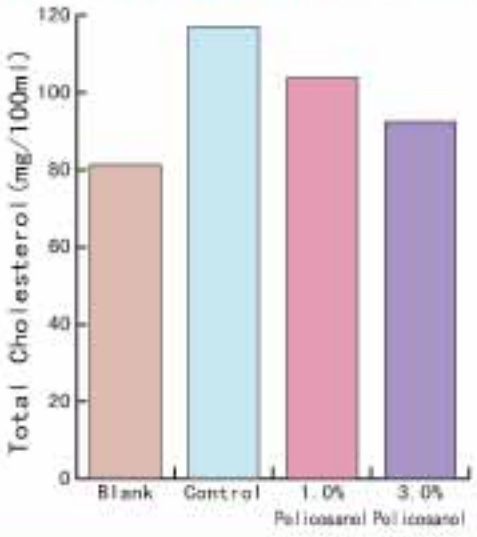
TSUNO

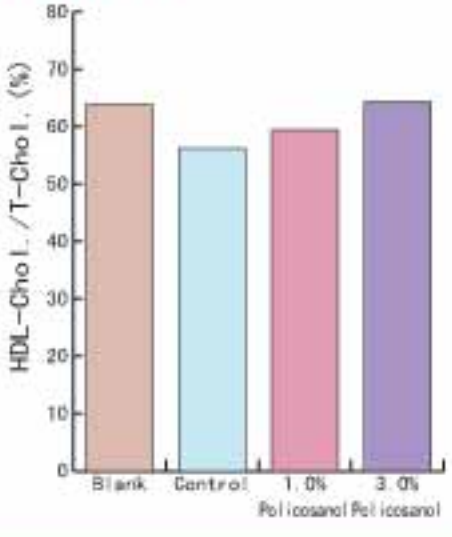
Policosanol

Rice bran wax alcohol (C24~C32),
with Octacosanol (C28) as main ingredient

- Normalize cholesterol level
- Reduce LDL-cholesterol level while maintaining HDL-cholesterol level
- Improve endurance

Cholesterol lowering effect





Tsuno R & D dept.

Specification

Acid value(mg KOH/g)	: 15.0	max.
Saponification value(mg KOH/g)	: 20.0	max.
Heavy metals	: 10 ppm	max.
Arsenic	: 0.1 ppm	max.

http://www.tsuno.co.jp

Riceutical™ Products

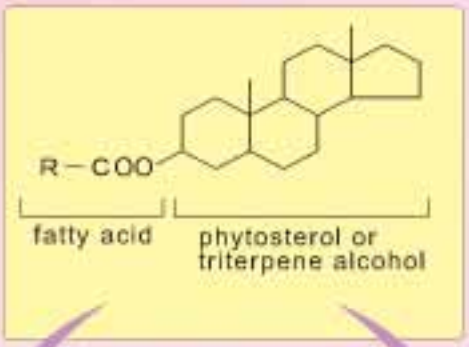
TSUNO

Riceterol Esters

Natural sterol esters extracted from rice bran

- Soluble in oil and fats
- Cholesterol lowering effect

Structure



C18:1 (Oleic acid)
C18:2 (Linoleic acid)
C16:0 (Palmitic acid)
C18:3 (Linolenic acid)
C18:0 (Stearic acid)
etc.

Specification

Content of steryl esters	:	50%	min.
Acid value (AI - 6B)	:	2	max.
Loss on drying	:	1%	max.
Heavy metals	:	20 ppm	max.

Riceutical™ Products

TSUNO

Ricetrienol

Oil soluble concentrate from rice bran

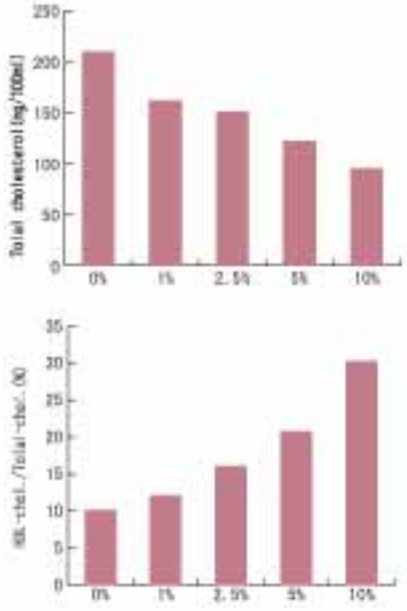
- Contain abundant amounts of "Vitamin E"
  Tocopherols (min. 2%)
  Tocotrienols (min. 2%)
- Contain phytosterol & triterpene alcohol (min. 15%)

Composition

(Reference value)

Phytosterol & Triterpene alcohol	15%
Squalene	5.0%
Tocotrienol	2.5%
Tocopherol	2.5%

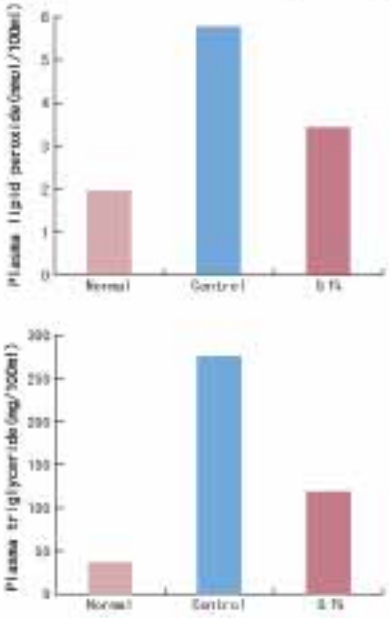
Dietary effect of Ricetrienol in lowering cholesterol



Each serum cholesterol was analyzed after feeding a high cholesterol diet for two weeks in rats(N=5).

Tsuno R & D dept.

Dietary effect of Ricetrienol on diabetes mellitus by using type 2 model mice(KKAy mice)



Each plasma lipid was analyzed after feeding a commercial diet for six weeks in rats(N=5).

Tsuno R & D dept.

Riceutical™ Products

TSUNO

Rice Germ Oil γ-30

Contain a high proportion (min. 30%) of "γ-oryzanol" which is a particular healthy component of rice

■Extremely rich in γ-oryzanol, 20 times more than normal rice germ oil

For anti-aging

For improvement of complaints associated with menopausal syndrome

For improvement of dry skin

Clinical data of γ-Oryzanol is reported enough to easily support for these applications

Specification

Acid value(Al - 6b)	: 3.0	max.
Saponification value	: 130 ~ 145	
Peroxide value	: 5 meq./kg	max.
γ-oryzanol	: 28.5 ~ 31.5 %	

Riceutical™ Products

TSUNO

γ-Oryzanol

Unique component of rice bran composed of ferulic acid ester with triterpene alcohols & sterols

- Activate organs and nerve systems
- Stimulate blood circulation and inhibit lipid peroxidation
- Improve metabolic syndrome and menopausal symptom

Specification

Heavy metals	: 20 ppm	max.
Arsenic	: 2 ppm	max.
Loss on drying	: 0.5 %	max.
Residue on ignition	: 0.1 %	max.
Assay	: 98 %	min.

Lipid metabolism action

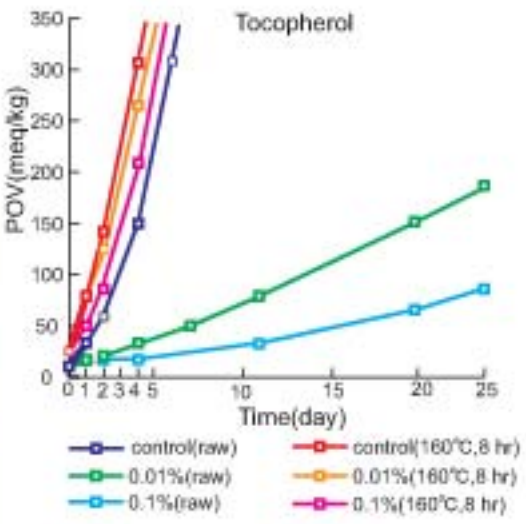
	Serum lipid (mg/dL)			Liver lipid (mg/dL)
	TC	HDL	LDL+VLDL	TC
Control	65.1±3.0	29.9±1.5	35.2± 2.1	3.05±0.13
HCD※	311.3±19.7	12.4±1.0	299.4±20.1	107.7±4.8
HCD+0.5% Oryzanol	248.9±10.9	16.0±1.0	232.9± 9.1	79.2±5.7

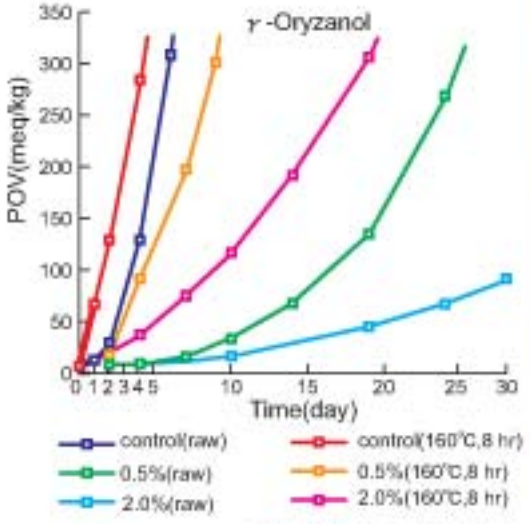
(※ HCD : High Cholesterol Diet)
G.S. Seetharamaiah, N. Chandrasekhara. (1993). J. Food Sci. Technol., 30 (4), 249-252

Composition of γ-Oryzanol
(Reference value)

Campesteryl ferulate	・・・13.2%
β-Sitosteryl ferulate	・・・ 7.4%
Cycloartenyl ferulate	・・・36.3%
24-Methylenecycloartanyl ferulate	・・・40.7%

Antioxidant activity（heat resistance）





T.Fukushi, Toxicology, 16, 111(1996)

http://www.tsuno.co.jp

Riceutical™ Products

TSUNO

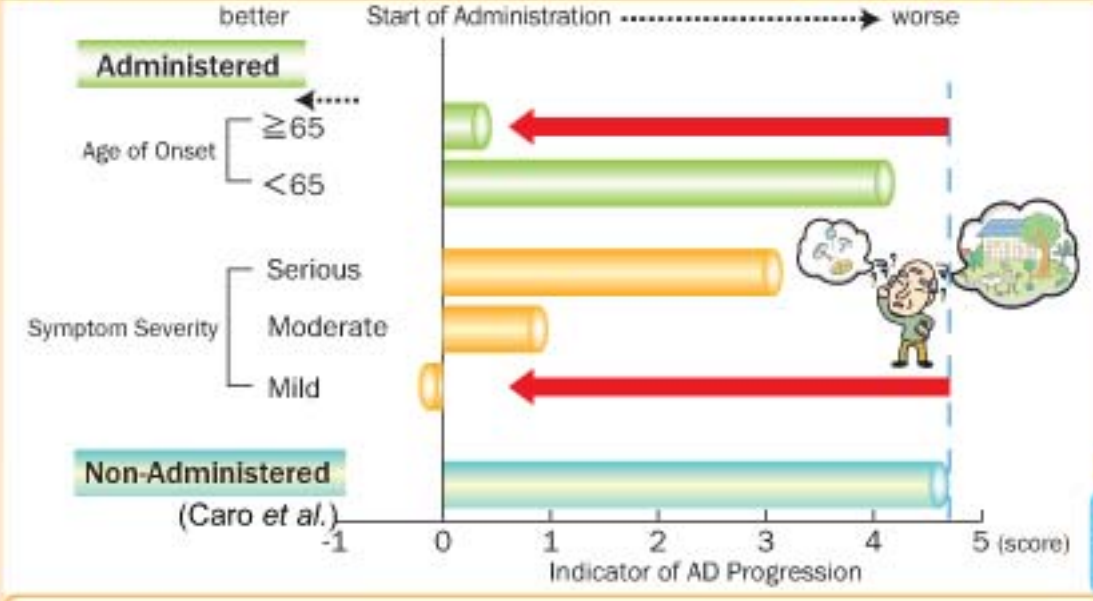
Ferulic Acid

Natural phenolic compound extracted from rice bran

- Antioxidant
- Various physiological activities such as suppression of advance of Alzheimer-type disease, antitumor activity, and blood glucose reduction effect

Effect of ferulic acid on healing of Alzheimer-type disease (AD)

ANM176™ (principal component: 100 mg of Ferulic Acid) was administered to 143 AD subjects twice a day. → after 9 months → Estimation of AD Progression (ADAS-Jcog)



Ferulic Acid is → Effective for Improvement of Cognitive Function and Repression of AD Progression
Especially Effective for Mild and Elderly-Onset Subjects

S. Nakamura *et al.*, Geriat. Med., 46, 1511-1519, 2008

Specification

Assay	: 98 %	min.
Heavy metals	: 20 ppm	max.
Arsenic	: 2 ppm	max.
Loss on drying	: 0.5 %	max.
Residue on ignition	: 0.1 %	max.

* Estimation of AD Progression (ADAS-Jcog)
ADAS-Jcog (Alzheimer's Disease Assessment Scale- Japanese Cognitive part) used is the Japanese version of a worldwide method of examination for estimation of AD Progression, especially for cognitive dysfunction, and is composed of 11 inspection items for three fields, memory, speech, and apraxia. Higher the score is, worse cognitive dysfunction is. ADAS-Jcog is often used as the sensitive indicator of AD progression and as judgment method for treatment effect of drugs in many clinical tests. The score described above is the difference of ADAS-Jcog score before administration and after 9 months administration.

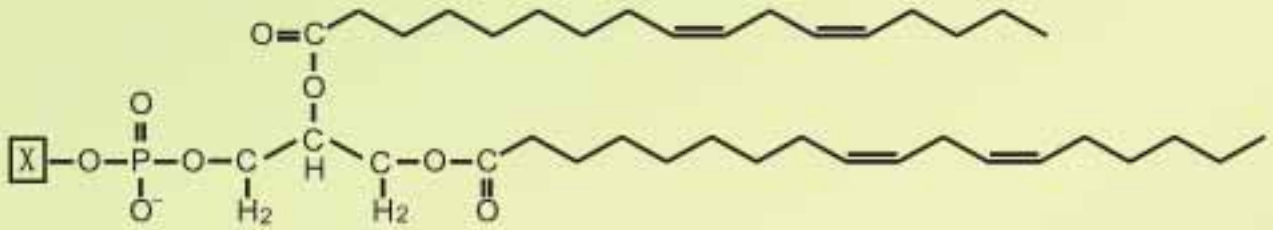
Riceutical™ Products

TSUNO

Rice Lecithin

Phospholipid extracted from rice bran

Structure



Phospholipid	X
PC : Phosphatidylcholine	—CH_2—CH_2—$N^+(CH_3)_3$
PE : Phosphatidylethanolamine	—CH_2—CH_2 —NH_3
PI : Phosphatidylinositol	—C_6H_6—$(OH)_5$

Specification

Acid value	:	50 max.
Moisture	:	3% max.
Peroxide value	:	10 max.
Acetone-insoluble matter	:	25% min.

Riceutical™ Products

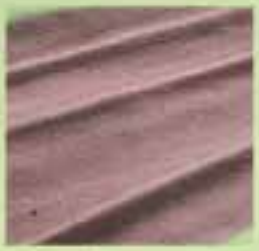
TSUNO

Defatted Rice Bran

(Defatted Rice Bran & Defatted and processed PF-60)

Defatted rice bran & PF-60 (Protein + Fiber content : min. 60%) are our innovative oil-extracted rice bran products fortified with protein & fiber

- Defatted and dried
- Easy to use because of good storage performance
- Rich in dietary fiber
- Contain various kinds of protein, starch, dietary fiber, vitamins and minerals
- PF-60 is further rich in protein and fiber



Comparison data of nutrition facts of Raw Rice Bran & Tsuno's Defatted Rice Bran & PF-60

	Raw Rice Bran	Defatted Rice Bran	PF-60
Protein	14.8%	17.5%	★ 25.8%
Lipid	★ 19.6%	1.4%	1.7%
Fiber	20.5%	27.1%	★ 42.8%
Ash	8.5%	12.0%	1.9%
Carbohydrate	37.9%	47.6%	47.4%
Vitamin B1	1.2~2.4 mg/100 g	2.79 mg/100 g	0.16 mg/100 g
Vitamin B2	0.18~0.43 mg/100 g	0.30 mg/100 g	0.03 mg/100 g
Vitamin B6	0.9~2.8 mg/100 g	4.06 mg/100 g	0.53 mg/100 g
Vitamin B12	0~0.4 μg/100 g	0.25 μg/100 g	0.04 μg/100 g
Folate	0.04~0.14 mg/100 g	0.15 mg/100 g	19 μg/100 g
Niacin	26.7~49.9 mg/100 g	70.4 mg/100 g	27.6 mg/100 g
Pantothenic acid	2~6.1 mg/100 g	10.4 mg/100 g	0.81 mg/100 g

http://www.tsuno.co.jp

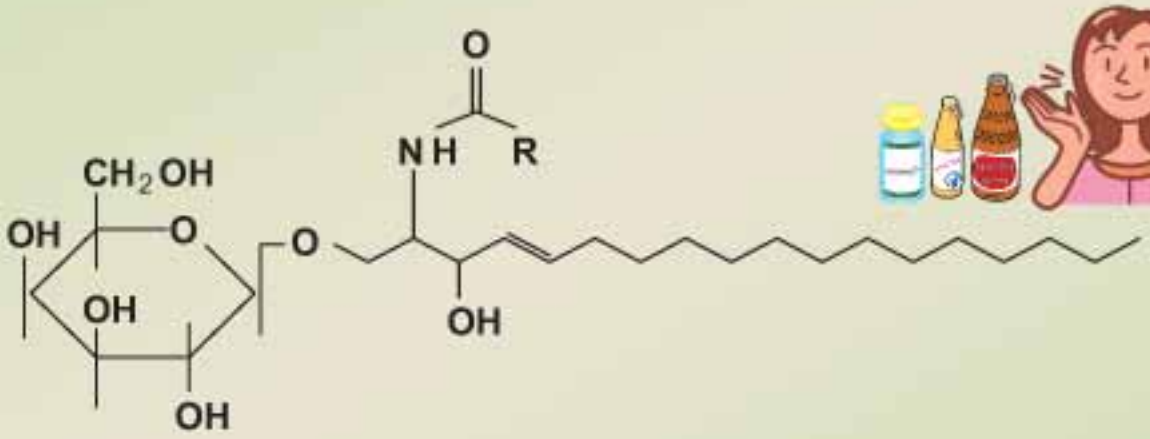
Riceutical™ Products

TSUNO

Riceramide

Phytoceramide extracted from rice bran

- Immunostimulating effect
- Anti-cancer effect



Specification

Description	: White or slightly yellow powder & odorless or faint characteristic odor
Sphingoglycolipid content	: 2.0～4.0%
Heavy metals	: 20 ppm max.

Riceutical™ Products

TSUNO

Rice Magnesium

Natural magnesium derived from rice bran

- Well absorbed and utilized without growth inhibition similar to conventional magnesium from other origins

Characteristic:

White or slightly gray powder, consists mainly of magnesium salt of phosphate

Specification

Magnesium	:	12.0%	min.
Total phosphor	:	20.0%	min.
Loss on drying	:	4.0%	max.
Heavy metals (as Pb)	:	25 ppm	max.
Arsenic	:	3 ppm	max.

Solubility

Rice magnesium powder is slightly soluble in water, but soluble in acid aqueous solution

Organic acid	Conc. of Rice Magnesium (%)	pH (after adding 1%)
Citric acid	6	2.5
Phytic acid (50% products)	2	2.8

http://www.tsuno.co.jp

Riceutical™ Products

TSUNO

RICEO™

Water soluble concentrate powder from rice bran

- Antioxidant
- Rich in carbohydrate, dietary fiber, protein, minerals and natural Vitamin B group
- Ingredient in various food products such as powder drink, cookies, bread and beverage

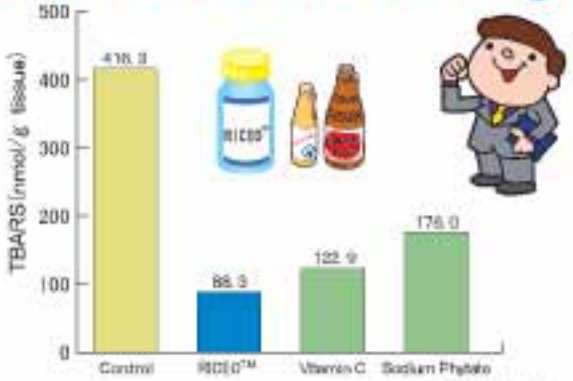
Composition (/100 g)

(Reference value)

Component	/100 g	Component	/100 g
Protein	8.2 g	Potassium	5.3 g
Dietary fiber	11.2 g	Magnesium	2.7 g
Sugar	30.0 g	Sodium	30.9 mg
IP6	27.8 g	Calcium	121.0 mg
GABA	237 mg	Iron	19.1 mg
Vitamin B1	7.2 mg	Zinc	13.1 mg
Vitamin B2	0.6 mg	Copper	0.4 mg
Vitamin B6	10.2 mg		

Tsuno R & D dept.

Antioxidant activity



Tsuno R & D dept.

Remineralizing activity

Groups	Control	Mg deficient	Mg deficient+1.7% RICEO™
Gains in body wt. (g/15 days)	112±1b	58±2a	★ 115±4b
Food intake (g/15 days)	225±4b	149±5a	246±7b
Kidney weight (% of Body weight)	0.94±0.03a	1.06±0.01b	0.93±0.02a
Serum Magnesium (mg/100 mL)	2.93±0.12c	0.56±0.17a	★ 2.41±0.10c
Total cholesterol (mg/100 mL)	91.9±4.7a	101.6±9.9b	95.5±7.4a
HDL cholesterol (mg/100 mL)	46.6±3.2a	30.4±3.6b	45.5±2.7a
VLDL+LDL cholesterol (mg/100 mL)	15.5±4.3a	71.2±6.4b	50.0±6.4a
Serum cholesterol (mg/100 mL)	82±12a	245±39b	★ 67±7a
Liver total fat (mg/g tissue)	174±13b	71±10a	★ 69±7a
Liver triglyceride (mg/g tissue)	87±6.3b	23±6.3a	22±4.0a

Each values ware measured after fed diet for 21 days in Wister rats (N=6).

Tsuno R & D dept.

Specification

Moisture	:	8.0 %	max.
Crude ash	:	30.0 %	min.
Total phosphor	:	7.5 %	min.
Heavy metals	:	25 ppm	max.

http://www.tsuno.co.jp

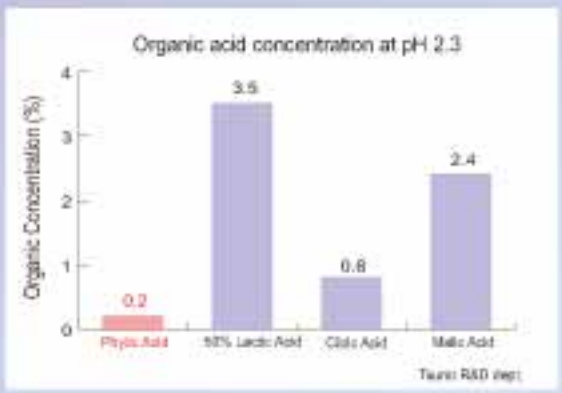
Riceutical™ Products

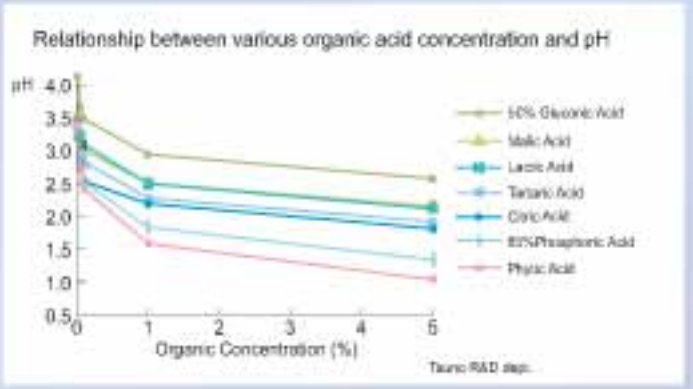
TSUNO

IP6 (Phytic acid・Phytin)

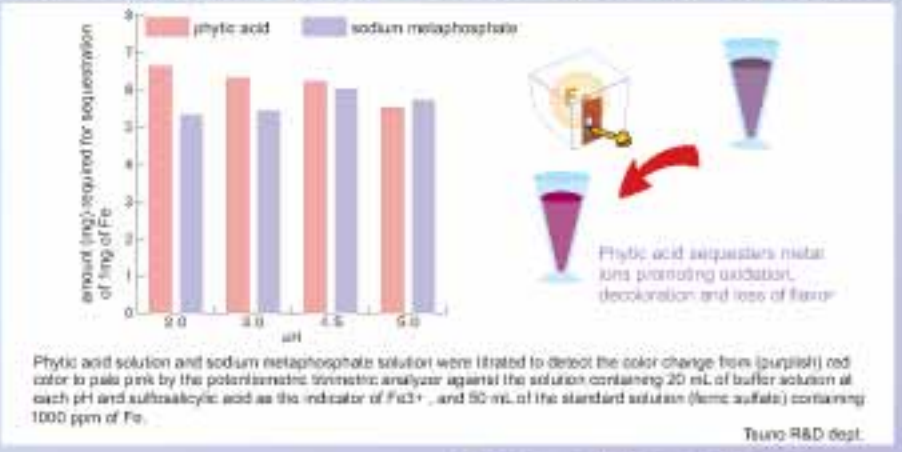
Organic acid extracted from rice bran

- Excellent pH adjuster
- Prevent color degradation in food and beverage
- Detoxification effect of heavy metals due to its strong chelating effect
- Various physiological activities such as anti-cancer effect





Sequestering ability comparable to synthetic chelating agent



Phytic acid solution and sodium metaphosphate solution were titrated to detect the color change from (purplish) red color to pale pink by the potentiometric trimetric analyzer against the solution containing 20 mL of buffer solution at each pH and sulfosalicylic acid as the indicator of Fe^{3+}, and 50 mL of the standard solution (ferric sulfate) containing 1000 ppm of Fe.

Tsuno R&D dept.

Specification

Phytic acid

Heavy metals	: 20 ppm	max.
Arsenic	: 2 ppm	max.
Phytic acid contents	: 48.0% ~ 52.0%	
Total phosphor	: 13.5% ~ 14.6%	
Inorganic phosphor	: 1.0%	max.
Chloride	: 0.04%	max.
Sulfate	: 0.072%	max.

Phytin

Heavy metals	: 40 ppm	max.
Arsenic	: 4 ppm	max.
Loss on drying	: 2.0%	max.
Residue on ignition	: 68.0% ~ 78.0%	
Total phosphor	: 18.0%	min.

http://www.tsuno.co.jp

Riceutical™ Products

TSUNO

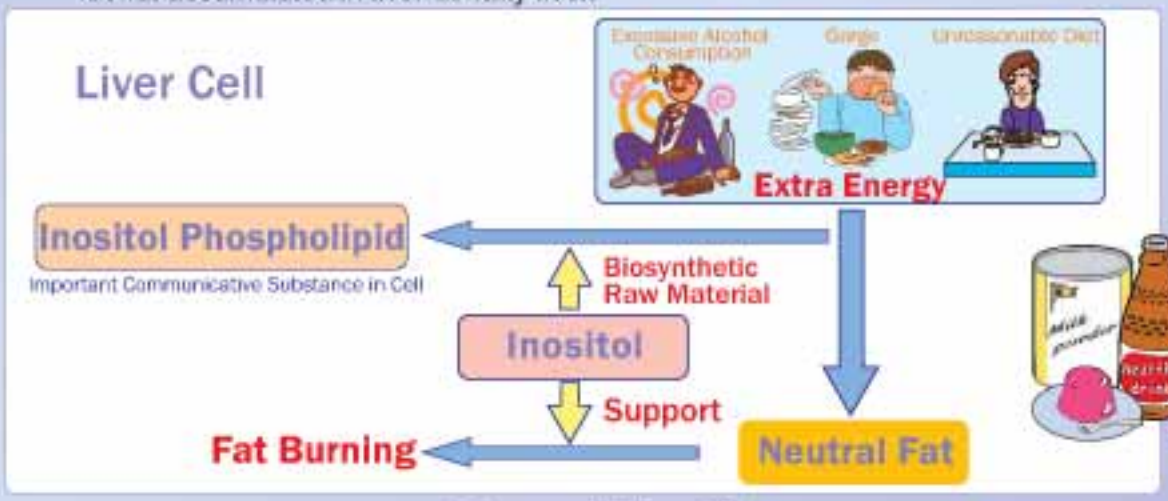
Inositol

Inositol induces the biosynthesis of Inositol phospholipid, reducing the formation of neutral fat. Inositol also promotes the burning of fat as it exhibits a vitamin B-like functionality.

- Readily soluble in water
- Sweet (balanced quality of taste)
- Vitamin B-like substance
- Improve metabolic syndrome
- Prevent fatty liver
- Treat panic disorder and obsessive compulsive disorder

Effect of inositol on the suppression of fatty liver

Liver cells usually store a constant amount of fat before transportation to the body. However, excessive alcohol consumption worsens the fat transportation system, so fat accumulates in liver as fatty liver.



Specification

Melting range	:	224.0 °C ~ 227.0 °C	
Loss of drying	:	0.5 %	max.
Residue on iginition	:	0.1 %	max.
Sulfate	:	60 ppm	max.
Chloride	:	50 ppm	max.
Heavy metals	:	10 ppm	max.
Calcium	:	Passes test	
Iron	:	5 ppm	max.
Assay	:	97 %	max.

Riceutical™ Products

TSUNO

Rice Bran Protein

(Tsuno-RBP)

Rice Bran Protein contains min. 50% protein

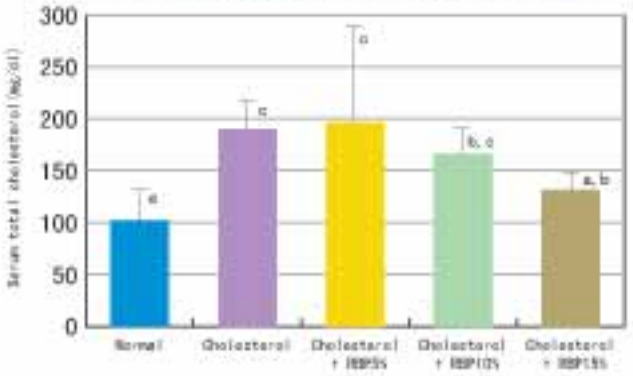
- Hypo-cholesterolemic effect is stronger than that of soybean protein
- Prevent body fat accumulation
- Well-balanced amino acid composition compared with other vegetable proteins

Amino acid composition

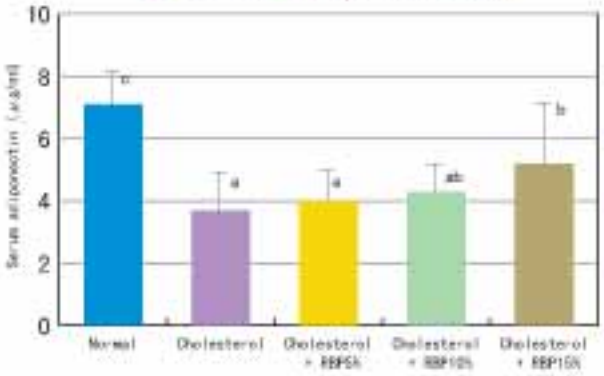
	g/100 g		g/100 g
Arg	5.49	Ala	3.72
Lys	3.23	Gly	3.22
His	1.90	Pro	2.51
Phe	2.73	Glu	7.99
Tyr	1.95	Ser	2.71
Leu	4.47	Thr	2.23
Ile	2.19	Asp	4.76
Met	1.16	Trp	0.90
Val	3.46	Cys-Cys	0.95

Cholesterol lowering effect of dietary RBP

Serum total cholesterol



Serum adiponectin



T. Kawada, T. Moriyama, Tsuno R & D dept.

Specification

Protein content : 50.0 % ~ 60.0 %

Loss of drying : 10 % max.

http://www.tsuno.co.jp