

ONE PEPTAN,[®] A WORLD OF HEALTH BENEFITS



HEALTHY
AGING

JOINT &
BONE
HEALTH

SKIN
BEAUTY

SPORTS
NUTRITION

Collagen Peptides for a Healthy Lifestyle

Peptan[®]

PRODUCED & MARKETED BY ROUSSELOT

DARLING
INGREDIENTS

Capturing the health conscious consumers with collagen peptides



From ancient times, women and men of all ages have gone to great lengths to improve the way they look and feel – and to keep up an active lifestyle for as long as possible. In today's world of visual media and scientific progress, our expectations regarding health, wellness and beauty are higher than ever. And that's not all: we also want the benefits we expect to be trustworthy and substantiated by solid science. It is particularly true in our world with aging population.

Natural nutritional solutions are a growth market

Health and beauty solutions are hot worldwide – especially those that are natural and produce reliable results from within. Nutritionally enhanced foods, beverages and dietary supplements are a key force in this exciting development. Leading market research agency Mintel expects a compound annual growth rate for the nutraceuticals market of 7.7% between 2015 and 2022, while the global functional foods market is projected to reach \$2.5 billion by 2020.

Scientific evidence of health benefits means long-term success

Our growing understanding of physical wellness and beauty is leading manufacturers of nutraceuticals and functional foods to place ever higher demands on the quality, safety and natural origins of the ingredients they use – and on the science behind it all. Doing the science, in fact, is one of the secrets to dependable, lasting results in nutritional enhancement.



Meeting consumer's ultimate goal of feeling and looking good

Collagen, the ingredient that gives our bodies 'bounce'.

On this opportunity-rich global market, your success depends largely on using the right ingredients. Enter collagen.

Collagen is the main protein in the connective tissues of the body and represents almost 30% of all human protein content.

Collagen is a triple helix of alpha-chains of amino acids which build strong fibers used for the body's structure. In essence, it is the ingredient that holds everything together – a key structural protein that ensures the cohesion, elasticity and regeneration of all our connective tissues, strengthening the musculoskeletal system and the integrity of our skin.

After we turn 30, our collagen levels start to drop...

With age, our bodies naturally produce less collagen, bringing to light the first signs of aging. For most of us, this process begins around the age of 30. In our 40s, it accelerates, adversely affecting our skin, joints and bones. The good news? Peptan collagen peptides offer multiple proven benefits in the following key areas:

HEALTHY AGING

Promoting mobility, helping healthy agers to maintain physical well-being and stay active



JOINT AND BONE HEALTH

Ensuring an optimal joint and bone health for an active lifestyle



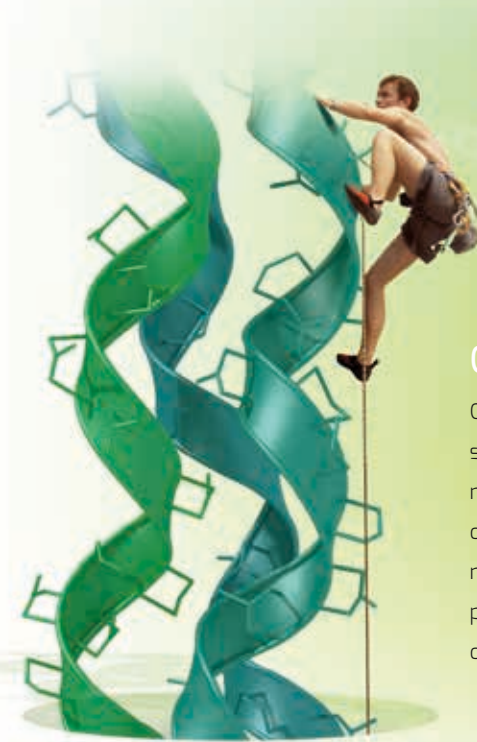
SKIN BEAUTY

Reversing skin aging by improving collagen structure from within



SPORTS NUTRITION

Keeping connective tissue healthy - the key to move freely and efficiently and help prevent injuries



Collagen is everywhere

Collagen is everywhere in the human body: in our bones, joints, tendons, ligaments and skin, as well as our smooth muscle tissue, blood vessels and other organs. It is even a major component of our hair and nails. Different types of collagen occur in different parts of the body; Type 1 collagen is the most prevalent. Different cells in our body tissues are responsible for the production of collagen. The cells use specific amino acids and peptides as building blocks to produce the large collagen helix structure, which is then organized into the strong fibers that provide structural tissue support.

One Peptan,[®] a world of health benefits

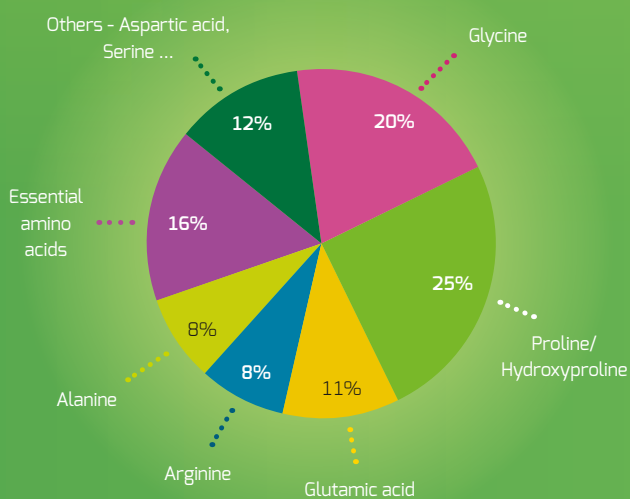


The world's leading collagen peptides brand

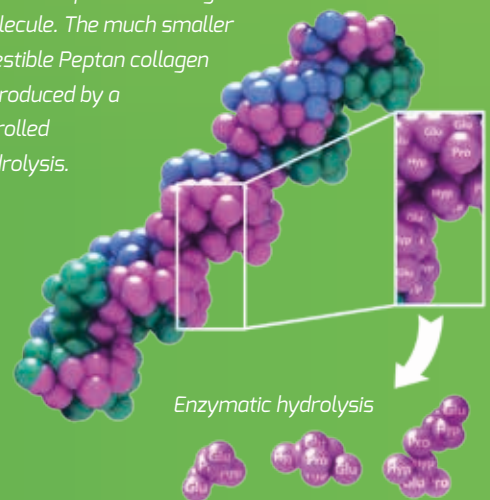
Produced and marketed by Rousselot, a Darling Ingredients brand, Peptan is the world's leading brand of collagen peptides. Specifically developed to deliver numerous health benefits and functional properties, Peptan is a natural, high-purity, bioactive product with a protein content of over 97% (on a dry weight basis). Being a Type 1 collagen, Peptan is identical to the collagen found in human bones and skin.

Unique amino acid composition

Peptan contains 18 amino acids, the building blocks of our tissues and the primary component of proteins. Glycine, proline and hydroxyproline represent around 50% of Peptan's total amino acid content (the glycine and proline concentration in Peptan is 10 to 20 times higher than in other proteins). As a result, Peptan offers nutri-functional properties that cannot be found in other protein sources.



Native collagen is composed of a large triple helix molecule. The much smaller and easily digestible Peptan collagen peptides are produced by a carefully controlled enzymatic hydrolysis.





Reaching the body parts that matter

Peptan collagen peptides are optimized for high bioavailability and bioactivity. This means they quickly reach the parts of the body where they are most needed – and with maximum effect. In fact, 90% of Peptan collagen peptides are digested and available within the connective tissues just a few hours after digestion. Research shows that collagen peptides present in the blood do indeed reach the connective tissues¹ – which is exactly what is needed for Peptan’s unique health and beauty benefits to do their part.

” The many benefits of Peptan have made it easier for us to develop products that can be adapted to the demands of different consumer groups

Ruby Chien, International Procurement Manager, TCI

World’s widest range

Available in the widest range possible, Peptan collagen peptides match a variety of innovative product requirements. Our global leadership in the production and supply of collagen peptides – combined with our worldwide presence, customer-driven approach and advanced technical expertise – enables us to offer you maximum reliability and involvement as a manufacturer.

Available in 3 raw material origins and 2 main standard grades:

Peptan® P: Porcine collagen peptides

Peptan® B: Bovine collagen peptides (Kosher- and Halal-certified)

Peptan® F: Fish collagen peptides (Kosher- and Halal-certified)

| Peptan® | Molecular weight | Powder density | Solubility | Odor and taste in powder |
|-------------------------------------|------------------|----------------|------------|--------------------------|
| Peptan® P Peptan® B Peptan® F | 2000 Da | High density | Good | Neutral |
| | | Low density | Excellent | Neutral |
| | 5000 Da | High density | Good | Neutral |
| | | Low density | Excellent | Neutral |

High density = 0.40 – 0.55 g/cm³ Low density = 0.25 – 0.35 g/cm³

¹ Watanabe-Kamiyama, M., et al., 2010, Absorption and effectiveness of orally administered low molecular weight collagen hydrolysate in rats. Journal of Agricultural and Food Chemistry, 58:835-841.



With Peptan[®] you can count on solid scientific evidence

Multiple proven health benefits

Peptan has gained worldwide recognition due to the substantial scientific evidence that backs it up. Our product's efficacy in providing key health and beauty benefits has been demonstrated in double-blind, placebo-controlled clinical studies and results have been published in leading scientific journals. Peptan is a unique ingredient solution with multiple proven health benefits to support overall mobility. By boosting the collagen content of the skin for a more youthful appearance, Peptan can meet the consumer's ultimate goal of feeling and looking good.

References

- ² Jiang, J.X. et al., 2014, Collagen peptides improve knee osteoarthritis in elderly women: a 6-month randomized, double-blind, placebo-controlled study. *Agro FOOD Industry Hi Tech*, 25:19-23
- ³ Dar, Q.A. et al., 2016, Oral hydrolyzed type 1 collagen induces chondroregeneration and inhibits synovial inflammation in murine posttraumatic osteoarthritis. *Osteoarthritis and Cartilage*, 24:5532-5533
- ⁴ Guillerminet, F. et al., 2010, Collagen Peptides Improves Bone Metabolism and Biomechanical Parameters in Ovariectomized Mice: an *In-Vitro* and *In Vivo* Study. *Bone*, 46:827-834
- ⁵ Guillerminet, F. et al., 2012, Hydrolyzed collagen improves bone status and prevents bone loss in ovariectomized C3H/HeN mice. *Osteoporosis International*, 23(7):909-1919
- ⁶ Daneault, A. et al., 2014, Hydrolyzed collagen contributes to osteoblast differentiation in vitro and subsequent bone health in vivo. *Osteoarthritis and Cartilage*, 22:5131
- ⁷ Daneault, A. et al., 2015, Biological effect of hydrolyzed collagen on bone metabolism. *Critical Reviews in Food Science and Nutrition*, 10:1040-8398
- ⁸ Hays N.P. et al., 2009, Effects of whey and fortified collagen hydrolysate protein supplements on nitrogen balance and body composition in older women. *Journal of the American Dietetic Association*, 109:1082-1087.
- ⁹ Paddon-Jones, D. et al., 2004, Potential Ergogenic Effects of Arginine and Creatine Supplementation. *The Journal of Nutrition*, 134(10):2888S-2894S.
- ¹⁰ Clark, K.L. et al., 2008, 24-week study on the use of collagen hydrolysate as a dietary supplement in athletes with activity-related joint pain. *Current medical research and opinion*, 24(5):485-1496.

Mobility: Peptan offers a holistic approach to support overall mobility

HEALTHY AGING

Peptan simultaneously promotes all the connective tissues of healthy agers by stimulating local cells in the target tissues to produce more collagen and other key matrix components. A wide range of studies has demonstrated its benefits for healthy joints^{2,3} and strong bones^{4,5,6,7}. Collagen peptides also support lean muscle mass and strength⁸.

JOINT AND BONE HEALTH

Joint and bone healthcare is gaining recognition as a vital part of an active and sports-oriented lifestyle and also as a way of maintaining mobility at an older age. This trend offers dietary supplement manufacturers excellent opportunities. Peptan has been proven to improve joint function and flexibility^{2,3} and to maintain bone health^{4,5,6,7} – crucial benefits for those who wish to maintain an active lifestyle.

¹¹ Wienicke, E., 2011, In: Performance Explosion in Sports – an anti-doping concept. Meyer&Meyer Fachverlag und Buchhandel GmbH, ISBN-10: 1841263303

¹² Minaguchi, J. et al., 2005, Effects of ingestion of collagen peptide on collagen fibrils and lycosaminoglycans in Achilles tendon. Journal of Nutritional Science and Vitaminology, 51:169-174

¹³ Shaw, G. et al., 2016, Vitamin C-enriched gelatin supplementation before intermittent activity augments collagen synthesis. American Journal of Clinical Nutrition, doi:10.3945/ajcn.116.138594

¹⁴ Asserin, J. et al., 2015, The effect of oral collagen peptide supplementation on skin moisture and the dermal collagen network: evidence from an ex vivo model and randomized, placebo-controlled clinical trials. Journal of Cosmetic Dermatology, 14:291-301. doi:10.1111/jocd.12174

¹⁵ Borumand, M. et al., 2014, Daily consumption of the collagen supplement Pure Gold Collagen® reduces visible signs of aging. Clinical Interventions in Aging, 9:1747-1758

SPORTS NUTRITION

Proteins deliver numerous health benefits. Specific bioactive proteins – collagen peptides in particular – can offer benefits beyond muscle building. These include improving athletic performance^{9,10}, protecting connective tissues^{10,11,12}, supporting healthy joint maintenance^{2,3} and helping to reduce the risk of injury¹³.

Beauty: Peptan reverses skin aging from within

SKIN BEAUTY

Peptan's multiple anti-aging benefits are well-documented. In several clinical studies^{14,15} visible effects have been demonstrated after just one month of use. Peptan can counteract the effects of aging and promote a more youthful appearance by boosting and restructuring the skin's collagen network from within. By stimulating the production of hyaluronic acid, Peptan also offers skin hydration benefits.



The right collagen for all your applications

Satisfy your customers efficiently and cost-effectively

Thanks to our extensive R&D capabilities and uncompromising quality control and sensory testing panels, Peptan collagen peptides offer a consistently superior sensory profile. Add that to Peptan's unique mix of proven health benefits and functional capabilities, and you have the ideal solution for (cost-) effectively boosting the nutritional qualities of your products – and satisfying your customers.

Easy to use in many formulations

As a manufacturer you can use Peptan in many different formulations, from dietary supplements and powdered drinks to nutrition bars, confectionery, dairy and more. Peptan is your recipe for success in producing healthy, attractive food, dietary and nutricosmetic solutions.

- Instant solubility in cold or warm liquid
- Superior wettability
- Transparent in solution
- Heat-resistant
- PH-stable
- Dust-free powders
- Excellent flowing properties
- Compatible with other active ingredients, such as vitamins and minerals



” Peptan has allowed us to develop various products with different benefits for joints, bones, skin and hair. The range uses collagens from different sources, all of premium quality

Miguel Ángel Mas Leal, Manager, Vaminter



No worries about international compliance

With Peptan, you will have no worries about compliance. Our products comply with most international food regulations, including European Regulations (EC) N° 853/2004 and N° 2073/2005 on food hygiene and the American Food Chemical Codex (FCC). Peptan carries GRAS status. Peptan B and F are also available with Halal or Kosher certification.

A natural, clean label product

Peptan collagen peptides are a natural product, with excellent digestibility and no additives or preservatives. They are a clean label food ingredient.

Peptan is usually labeled as 'Collagen Peptides' or 'Hydrolyzed collagen'. In the European Union and the USA, collagen peptides manufactured from fish must be labeled as 'Fish Collagen Peptides' or 'Fish Hydrolyzed Collagen'.

Peptan's variety of product applications



Dairy



Powder drinks



Beverages



Tablets and capsules



Nutritional bars



Confectionery

Benefit from our (co-)innovation, commitment & world-class expertise

With Peptan, you will have a reliable, closely connected partner

At Peptan, we believe in our science. Peptan provides multiple health benefits by acting as building blocks for healthy joints, bones and muscles as well as skin. Globally recognized as the leading collagen peptides brand, Peptan consistently delivers the highest quality and support to meet your innovation and formulation needs. Peptan is the one bioactive ingredient that brings you a step closer to a healthier tomorrow.



1. Trustworthy, up-to-date science

Peptan is recognized worldwide for its unrivalled scientific backing. Our world-class nutritional scientists work with leading academics and universities around the world. Even today, in-vitro and in-vivo research – including double-blind, placebo-controlled clinical studies – is ongoing, with a focus on the mechanisms of Peptan and its influence on human health.

- Many years of experience in researching and developing collagen peptides
- State-of-the-art, certified and facilities in France and Brazil
- Expert R&D teams
- Global leadership in our field

We'll help you communicate the science, too

Our global research teams and local technical experts are eager to join hands with you in growing your business and communicating the science behind Peptan. We can provide you with scientific evidence files, communication support and support in educating consumers about the value of collagen peptides.

2. Quality & safety

As a trusted partner of major food and pharmaceutical manufacturers around the world, we appreciate the importance of quality and safety. Our constant focus is on ensuring the complete safety of every product and process we are responsible for.

- Premium, 100% natural collagen peptides, safe and free from any preservatives or additives
- HACCP- and ISO9001-certified plants
- Full compliance with the highest international quality standards
- Full traceability throughout every step of our production process

Full control from source to final product

At Rousselot, we take the utmost care in selecting our materials as well as our raw material suppliers, submitting them to the strictest quality control programs. We set high sustainability standards and our sourcing centers predominantly on ASC-certified fisheries and grass-fed cattle.

3. Formulation optimization

The Peptan Expertise Center focuses on new product and application developments and innovation in nutritional science and research. We optimize nutrition and health benefits, while making sure product taste and consumer appeal stay in focus. Our scientists have at their disposal the very best, most advanced analytical equipment for researching and developing new collagen peptide applications.

- Our technical experts work in close partnership with you
- We have application centers supporting all major markets
- We can offer tailored answers to your questions

We can help get your product faster to market

We will help you improve and facilitate the use of Peptan products in your application, co-develop new products with you and help you get them onto your market faster.

4. Co-innovation

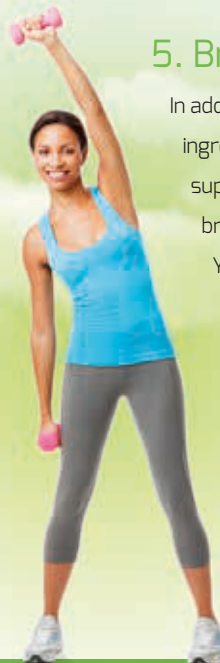
We believe that in today's complex markets, co-innovation is the way forward. One great example of our efforts in this area are our Innovation Days. They offer you a unique opportunity to work with our experts on developing successful, marketable innovations, such as a new dietary supplement or functional food with Peptan inside.

Joint our Innovation Day to gain insights of the latest marketable innovations.

5. Brand development

In addition to globally recognized science and award-winning ingredients, we also offer outstanding brand development support. We have developed successful ingredient branding strategies with several trusted customers. You, too, can benefit from endorsement by Peptan branding and the opportunity to list Peptan as one of the ingredients used in your product.

Peptan is a registered trademark of Rousselot. Contact us to know more about our co-branding program.



OUR SALES OFFICES AROUND THE WORLD

EUROPE, MIDDLE EAST, AFRICA

europa@rousselet.com

Northern, Central and Eastern Europe, UK and Ireland

Rousselet B.V.B.A.
Meulestedekaai 81
9000 Gent Belgium
+32 9 255 18 60

France, Southern Europe, Middle-East, Africa

Rousselet S.A.S.
4 rue de l'abreuvoir
92400 Courbevoie France
+33 1 46 67 87 00

Spain and Portugal

Rousselet Gelatin S.L.
Paratge Pont de Torrent, S/N
17464 Cervia de Ter (Girona) Spain
+34 972 49 67 00

SOUTH AMERICA AND CENTRAL AMERICA

rousselet.brasil@rousselet.com

Brazil

Rousselet Gelatinas do Brasil LTDA
Rua Santo Agostinho, N° 280
Distrito de Arcadas
CEP 13908-080
Amparo - São Paulo Brasil
+ 55 19 3907 9000

South and Central America (except Brazil)

Rousselet Argentina S.A.
Avenida Gobernador Vergara 2532
1688 Villa Tesei - Hurlingham
(Provincia de Buenos Aires) Argentina
+ 54 11 44 89 81 00

NORTH AMERICA AND MEXICO

gelatin.usa@rousselet.com

Rousselet Inc.
1231 South Rochester Street, Suite 250
Mukwonago, WI 53149 USA
+1 888 455 3556

CHINA

info@rousseletchina.com

Rousselet China
25/A, No. 18 North Cao Xi Road
Shanghai - PO: 200030 China
+86 21 6427 7337

JAPAN AND SOUTH KOREA

japan@rousselet.com

Rousselet Japan K.K.
Ishikin-nihonbashi Bldg, 6F
4-14-7 Nihonbashihocho, Chuo-Ku,
Tokyo 103-0023 Japan
+81 3 5643 7701

SOUTH EAST ASIA

sea@rousselet.com

Taiwan, Hong Kong, Australia, New Zealand, India and Sri Lanka

Rousselet (M) SDN. BHD.
Block P3-21, Plaza Damas
Jalan Sri Hartamas 1
50480 Kuala Lumpur Malaysia
+603 6201 8282

Your Rousselet and Peptan sales contact information:

About Rousselet and Peptan:

Rousselet and Peptan are both brands of Darling Ingredients Inc. Rousselet is the global leader¹ of gelatin and collagen peptides. Rousselet's wide range of collagen peptides are marketed under the Peptan brand. We work in partnership with our customers all over the world, delivering innovative and advanced ingredient solutions manufactured through state of the art operations. We help our customers achieve their goals, enabling them to create world class pharmaceutical, food and nutritional products to inspire and excite today's demanding consumers.

¹ Global Industry Analysts, Inc, Gelatin a Global Strategic Business report, Nov 2016

All rights reserved. No part of this brochure may be reproduced, distributed or translated in any form or by any means, or stored in a database or retrieval system, without the prior written permission of Rousselet. Rousselet alone retains the copyright to the entire content of this brochure and the intellectual property rights to all designations of our products stated in this brochure and intellectual property rights to the products themselves. Nothing in this brochure constitutes a license (explicit or implicit) of any of Rousselet's intellectual property rights. The duplication or use of product designations, images, graphics and texts is not permitted without Rousselet's explicit prior written consent. Rousselet makes no representation or warranty, whether expressed or implied, of the accuracy, reliability, or completeness of the information, nor does it assume any legal liability, whether direct or indirect, of any information. Use of this information shall be at your discretion and risk. Nothing herein relieves you from carrying out your own suitability determinations and tests and from your obligation to comply with all applicable laws and regulations and to observe all third party rights. This product is not intended to diagnose, treat, cure, or prevent any disease. You should always consult your medical provider when using the product together with medical treatments, diets or fitness programs. The uses and claims for Rousselet's products recommended in the brochure should be adapted to the current local regulatory environment. This statement has not been evaluated by the Food and Drug Administration.

Rousselet Headquarters:

Rousselet B.V. Kanaaldijk Noord 20 5691 NM Son The Netherlands
Phone: +31 499 364 100 Fax: +31 499 364 972 peptan@rousselet.com

peptan.com



PeptanbyRousselet



@Peptan_Global



Collagen Peptides

Peptan[®]

PRODUCED & MARKETING BY ROUSSELET

DARLING
INGREDIENTS