ΣNNAGRAM

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AVENNA MP25

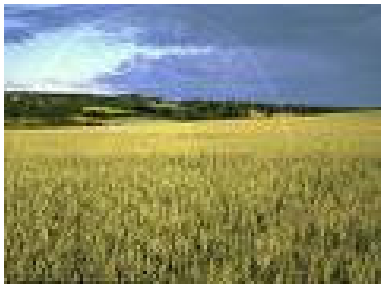
HIGH BETA-GLUCAN OAT EXTRACT

1. INTRODUCTION AND DESCRIPTION

People have been eating oats and oat products since the first century AD. Regarding oat and topical skin care, oatmeal has a long history of cosmetic use in facial masks and as an additive in bath and soaps to relieve irritation or itching.

AVENNA MP25 is an oat (*Avena sativa*) extract with a content of 21 - 25 % beta-glucan, a polysaccharide that has been found to be a moisturising and wound-healing ingredient, but also a very powerful stimulator of the immune system.

In addition, AVENNA MP25 is a source of many other beneficial components such as proteins and amino-acids, essential fatty acids, minerals and vitamins.



2. RAW MATERIAL

AVENNA MP25 is made from rolled oats and water only.

The oats used in AVENNA MP25 are grown in EU on contract. An inspection panel approves the participating farms. The equipment used, such as silos and carriages must be totally clean and free from foreign seeds. Soil samples are taken in the fields to control cadmium levels. Certified seeds are used at sowing. During growth, a field inspection is made. At harvest a sample is analysed to ensure optimal quality of the oats. After cleaning and drying of the oats a second analysis is made. These steps are required to maintain the high quality of the oats as the perfect raw material for AVENNA MP25.

3. PRODUCTION PROCESS

The manufacturing process includes the carefully controlled conversion of the oat starch into the desired balance between different types of carbohydrates. The fibre content and balance between insoluble and soluble fibre is modified to obtain high levels of beta-glucan (min. 21 %). Some of the insoluble fibres are removed to obtain a homogenous product that gives a smooth texture to cosmetic formulations.

4. PRODUCT COMPOSITION

AVERAGE CONTENT:

Water	6.0 %
Ash	2.4 %
Protein	20.0 %
Fat	4.0 %
Dietary fibre	44.0 %
Carbohydrate	20.0 %

TYPICAL AMINO-ACID COMPOSITION OF OAT PROTEIN IN AVENNA MP25:

Aspartic acid	15.45 %	Proline	5.20 %
Glutamic acid	24.34 %	Tyrosine	1.05 %
Serine	6.75 %	Valine	3.13 %
Glycine	11.65 %	Methionine	0.98 %
Histidine	1.39 %	Cysteine	1.03 %
Arginine	4.78 %	Isoleucine	2.10 %
Threonine	3.26 %	Leucine	6.19 %
Alanine	8.46 %	Phenylalanine	1.09 %
		Lysine	3.16 %

TYPICAL FATTY ACID COMPOSITION OF OAT FAT IN AVENNA MP25:

C 12:0	Lauric acid	0.3 %
C 14:0	Myristic acid	0.4 %
C 16:0	Palmitic acid	14.1 %
C 16:1	Palmitoleic acid	0.3 %
C 18:0	Stearic acid	3.2 %
C 18:1	Oleic acid	42.8 %
C 18:2	Linoleic acid	35.4 %
C 18:3	Linolenic acid	1.2 %
C 20:0	Eicosanoic acid	0.1 %
C 20:1	Eicosenoic acid	0.9 %
C 22:0	Behenic acid	0.7 %
C 22:1	Erucic acid	0.4 %

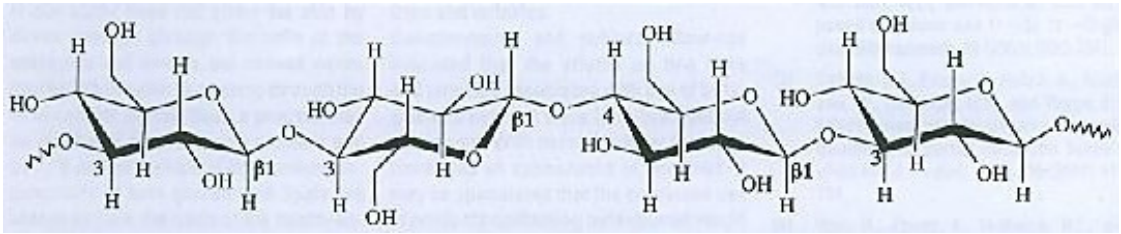
TYPICAL VITAMIN CONTENT PER 100 G IN AVENNA MP25:

Alpha-tocopherol	5.3 mg
Thiamine, B1	0.3 mg
Riboflavin, B2	0.9 mg
Niacin	1.3 mg
Folic acid	44 µg
Pyridoxine, B6	0.2 mg

TYPICAL MINERAL CONTENT PER 100 G IN AVENNA MP25:

Iron	11 mg
Magnesium	250 mg
Manganese	1.1 mg
Phosphorus	270 mg
Potassium	680 mg
Sodium	8 mg
Zinc	6 mg
Calcium	120 mg

5. MOLECULAR STRUCTURE AND FUNCTION



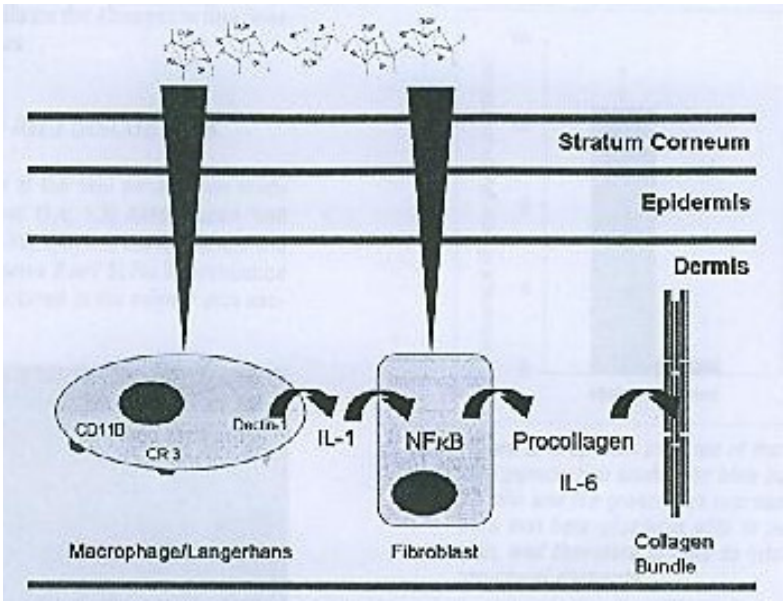
Chemical structure of oat beta-glucan showing the beta 1,4 and beta 1,3 glycosidically linked glucose polymer structure.

Oat naturally contains about 4 to 6% beta-glucan.

Beta-glucan is a polysaccharide, a homopolymer of glucose in which contiguous short runs of 1,4-linked glucose units are linked in turn to other such runs via a 1,3-link. The average molecular weight of oat beta-glucan is in excess of 1.0×10^6 Daltons based upon light-scattering measurements.

Oat beta-glucan has structural similarities with hyaluronic acid, a material widely used for building high viscosity and as a moisturiser imparting smoothness to the skin. Comparative-flow curves for 1% hyaluronic acid and oat beta-glucan show the response of viscosity as a function of shear rate. The flow behaviours are not identical; however, each behaves as a pseudoplastic fluid (the viscosity decreases with an increase in the applied shear rate). Oat beta-glucan can thus be a thickener and stabiliser in addition to providing a film-former and a lubricating moisturiser. Oat beta-glucan thus builds viscosity and moisturises the skin. Studies made on beta-glucan show that it can also stimulate the immune system and contribute to wound healing.

6. COSMETIC PROPERTIES



Proposed mechanism for the skin penetration of beta-glucan. Above the stratum corneum (horny layer) and epidermis, beta-glucan forms a thin film to promote moisturisation. Within the dermis, beta-glucan is able to produce collagen synthesis through direct interaction with fibroblasts and through indirect, cytokine mediated, interaction with macrophages.

· **Beta-glucan has water binding properties.**

Beta-glucan has the ability to form a protective film on the skin that minimise moisture loss and protects from external aggressions such as pollution. It also enhances persistent skin smoothness, reduces skin irritations and improves the overall performance of cosmetic products.

· **Beta-glucan activates the immune response of the skin and aids in skin healing.**

Beta-glucan has been proved to activate Langerhans cells that play a dominant role at the epidermal level of the skin. These Langerhans cells act as a defence against infections (they trap antigens such as chemicals and bacteria) and as a wound healer using factors such as Epidermal Growth Factor and Angiogenesis Factor. Beta-glucan also activates macrophage cells that aid in the decontamination of the skin by removing bacteria and dead tissue and recruiting other cells of the white blood series which are active in the resolution of infection.

· **Beta-glucan is a free-radical scavenger.**

Beta-glucan has the ability to scavenge free radicals and protects the skin against oxidation damages such as lipid peroxidation.

It has also been shown that the beta-glucan absorbed inside the Langerhans cell, actually protects the cell from radiation damage, possibly due to its free radical scavenger properties.

· **Beta-glucan protects from sun exposure.**

Beta-glucan shows some sunscreening properties and also reduces the burn of sun exposure while allowing tanning to take place without peeling.

· **Beta-glucan is thus an excellent anti-ageing substance.**

With advancing age there is a general decline in the body's immune defence mechanisms and the skin becomes less and less able to heal itself and cope with infections. Environmental conditions including over exposure to the sun fastens this decline. A substance that enhances the skin natural ability to heal and protect itself and protect against sun damage would go a long way in remedying these problems. Beta-glucan is such a substance.

In aged or wrinkled skin treated with beta-glucan, there is an increased production of collagen and elastin thus improving the skin appearance and reducing the number, depth and length of wrinkles.

· **Beta-glucan also helps to heal acne lesions.**

Acne is one of the most distressing infections of the skin. Beta-glucan helps this condition by stimulating defences against infection and acting as a healer and cleanser.

Other components of AVENNA MP25 also bring their own properties:

· Vitamin E is a powerful free radical scavenger and may therefore limit the acceleration of the ageing process that free radicals cause. In addition, it also enhances the flexibility of cell walls to minimise wrinkles and blemishes, and also counteracts decreased function of the sebaceous glands.
As vitamin E helps to protect against lipid peroxidation in cell membranes, it is considered to provide a better water binding ability of the skin and can therefore act as a moisturiser. It is often referred to as the « moisturiser from within » because it is readily absorbed through the skin's surface into the dermis.

· Linoleic acid is an essential fatty acid and helps restore the intercellular moisture barrier in the stratum corneum, thus reducing transepidermal water loss and restoring the skin's normal function.

· Thiamine (vitamin B1) and riboflavin (vitamin B2) are co-enzymes of the cellular activity and metabolism.

· Niacin (vitamin B3) and folic acid protect skin and hair against UV radiations.

· Pyridoxine (vitamin B6) normalises skin pH and reduces sebum secretions. It also plays a role in the growth of hair and nails.

· Potassium has moisture-retaining properties. Abundant trace elements revitalise the cells.

7. ACTIVITY DEMONSTRATION

An in-vivo study brings to the fore the real efficiency of the AVENNA MP25 in a cosmetic product.

Protocol:

Administration of a cream for the face to 16 female volunteers between 18 and 39 years of age presenting symptoms of « sensitive skin ». Each subject applied the product twice a day on the face after cleansing.

Formula tested:

A.	Deionised water	qs.
	Carbomer 934 (Carbopol 934, BF Goodrich)	0.40 %
B.	Oat flour	5.00 %
	Cetyl alcohol	2.00 %
	Borage seed oil (Ennagram)	3.00 %
	Chilean musk rose oil (Ennagram)	2.00 %
C.	Deionised water	1.00 %
	Triethanolamine	0.40 %
D.	Preservative (Germaben II-E, Sutton)	1.00 %
	AVENNA MP25 (Ennagram)	5.00 %
	Fragrance	qs.

SUBJECTIVE MEASUREMENTS

The subjects rated 5 factors:

- skin redness - 14 %
- skin roughness - 15 %
- skin itching - 16 %
- skin lesions - 14 %
- cosmetic quality (odour, colour, texture, penetration, overall appreciation)

===> The subjective appreciation of the subjects shows a detectable improvement from 14 to 16 % on average. Overall cosmetic qualities are judged satisfying.

8. SPECIFICATIONS

Appearance	Thin powder
Colour	Pale yellow to beige
Odour	Neutral
Moisture	4.0 – 8.0 %
Particle size	100 % < 250 µm
Pesticides	Conforms to European Pharmacopoeia
Beta-glucan	21.0 - 25.0 %
Total germs	< 10 000 CFU/g
Yeasts and moulds	≤ 100 CFU/g
Escherichia coli	Absence
Salmonella pr. 25 gram	Absence

9. APPLICATIONS

Skin and body care: moisturising, soothing and protective preparations (creams, milks, lotions, cleansers, etc...), antiageing creams, facial masks, sunscreens and after-sun lotions, aftershave skin healers, lip balms, hand and foot care preparations, soaps, bath and shower gels.

Hair care: shampoos, conditioners, balms, especially for dry, damaged hair, and sensitive scalp.

Use level: 0.5 - 10 %.

Compatibility: AVENNA MP25 is compatible with most cosmetic ingredients as well as the majority of manufacturing conditions: pH values ranging from 3 to 10, high salt concentrations, temperatures as high as 80°C, non-ionic or anionic detergents, and alcohol preparations up to 40%.

Method of incorporation:

- gels and one phase water systems: disperse AVENNA MP25 into a portion of water phase, possibly containing a surfactant, and homogenise with dispergating implement during period of heating (prior to emulgation).
- O/W emulsions: disperse AVENNA MP25 into water phase and homogenise with a dispergating implement in the phase of heating (prior to emulgation).
- W/O emulsions: disperse AVENNA MP25 into water phase and homogenise with an external dispergating implement in the phase of heating (prior to emulgation).
- ointments: homogenise AVENNA MP25 with an external dispergating implement in lipophilic phase of low viscosity.
- AVENNA MP25 can also be incorporated at the end of the process: prepare a milk of oat in water or better in a multivalent alcohol or glycol and add the suspension to the cosmetic preparation at the end of manufacture.

Note: Mixing AVENNA MP25 with water to 10% dry substance gives classic oat milk.

10. TOXICITY

Oral toxicity:	Not toxic
Skin irritation (10 % in water):	Not irritant
Skin sensitisation (10 % in water):	Not sensitising
Photo-sensitisation:	Not a photo-sensitizer

Oat is also recognised as hypoallergenic.

11. PRODUCT IDENTIFICATION

INCI name (EU):	Avena Sativa Meal Extract
INCI name (US):	Avena Sativa (Oat) Meal Extract
CAS no.:	84012 26 0
Einecs no.:	281 672 4

12. STORAGE

Keep in the original tightly-closed container, at room temperature (20°C), protected from light, heat, and humidity sources.

12. REFERENCES

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