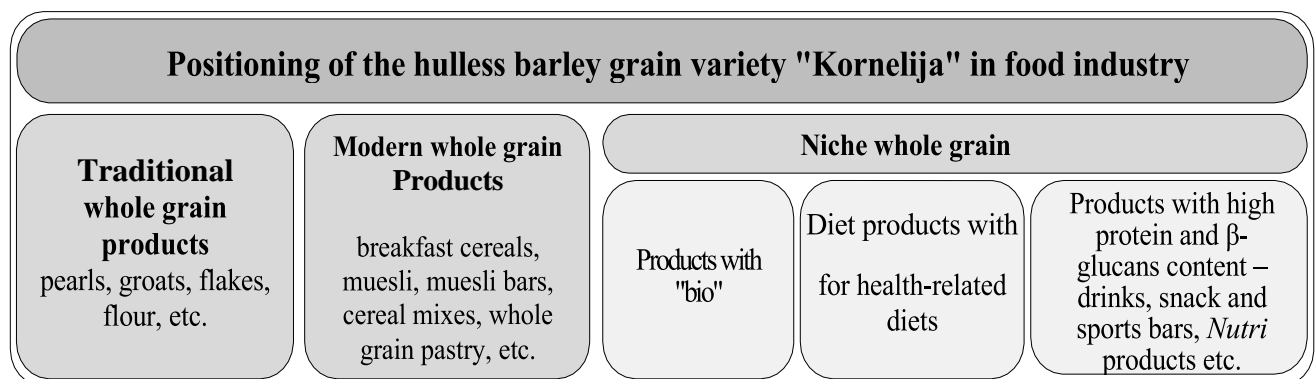


## Excellence for food of the hulless barley grain variety "Kornelija"

Kornelija is a hulless (naked) variety of barley developed in Latvia, which is especially suitable for production of niche and functional foods (including whole grain foods).

"Kornelija" grains have a unique chemical composition and excellent dietary value, **it is both a high-quality source of protein and fibre (especially beta-glucans), which is not typical of other barley varieties.** In the food market, it is a high-quality raw material for the production of functional foods in which cereals are used as a raw material.



Grain belonging to the Kornelija variety are suitable for development of classic product flakes, pearls, bread, and other products, and are especially favourable for development of new niche product recipes (especially for people who have to follow specific diets), as well as new (innovative) functional foods – muesli, energy bars, drinks and other recipes.



'Kornelija' barley is excellent for the production of **whole grain pearls**, because the variety is characterized by large grains of very similar size, the product will have a high nutritional value – amount of protein and fibre. Due to their large size and unusual (amber) colour, such pearls would be noticeable and distinctive on the market. According to production trials, pearl production is possible with standard equipment, high pearl yield is obtained (94%) compared to hulled barley (~70%), moreover, the peeling process is more equipment and energy efficient. Due to the amber colour, the grains are less suitable for the production of traditional (light) pearl barley.



'Kornelija' grains are also great for **barley flakes** due to their grain size. Flakes are even, high in high nutritional value, especially in the amount of dietary fibre. Compared to oat flakes, barley flakes have a lower fat content, therefore they are more fragile, less elastic. An appropriate flattening mode/technique should be matched (humidity, temperature) to reduce hardness, brittleness, so that flakes do not crumble during transportation and packaging.



The production of **flour** from 'Kornelija' grains is economically advantageous, as no hull removal is required and no residues are formed. Whole-grain barley flour is in demand on the market, and healthy dieters are increasingly choosing to replace wheat flour with richer ones. Barley flour is gluten-free, has a pleasant grey colour (pictured left) and a higher water-binding capacity than wheat flour.



In the **production of bread**, 'Kornelija' flour can replace up to 40% of wheat flour, both for baking sourdough bread and for making scalded dough. It should be noted that barley flour of this variety has a different (higher) water binding capacity. The bread comes out denser, with less volume and porosity.



**In pastry** – for shortcrust pastry dough, biscuits, baskets, cakes for baking – wheat flour can be completely replaced by 'Kornelija' flour. The taste of salty shortbread dough cookies is slightly similar to the taste of cheese cookies. Cookies have a high nutritional value, they are more fragile, fuller, in a darker tone of yellow. 'Kornelija' finely ground flour is perfect for waffles, less eggs and sugar can be added to the dough.

For muffins, the dough can be made entirely from 'Kornelija' flour, if kefir and a ripener are added to the dough. Cocoa is recommended to improve the color of the muffin cake. It is recommended to add no more than 20% of this flour in the yeast dough to ensure the porous structure of the product.



Barley 'Kornelija' "flour is ideal for the production of **extruded products** as extrusion preserves the full nutritional value of the grain. Coarse flour is more suitable for twin-screw extrusion devices, which ensures a more even incorporation of the added water. The product does not have a specific taste or smell, therefore various additives can be used for the production of both sweet and savory snacks. In combination with legume flour, it is possible to obtain a product with a balanced amino acid composition to ensure the body with necessary substances.



Barley "Kornelija" grains are suitable for **germination** in various conditions. When using the malting production technology (13-19°C; 144-174h), the mash coloured was acquired at 2.9EBC, Kolbach index 35.6%, viscosity 2.4MPas/s. When germinated at 35°C for 24 and 36 hours, they become active, their nutritional value increases, including protein content, vitamin C, but their fibre content decreases by 2.0% and 6.5%, respectively, gluten content decreases, after 36 hours of germination its content is 73.7ppm (<100). Sprouted (germinated), dried grain flour is a valuable raw material for making fine muesli or snack bars, for supplementing soups, stews and desserts.



If "Kornelija" grains are used to obtain **functional flours**, the removal of low-molecular-weight, water-soluble particles by sedimentation and filtration yields a 20% higher yield compared to oat functional flour. The colour of barley functional flour is dark, grey, the colour of oat functional flour is light, yellowish, the duration of the process does not differ.



In production of **pasta foods** with 'Kornelija' grain flour, up to 20% of the used wheat grain can be substituted. Such product contains 1.2% more protein, 1.3% more dietary fibre and 4 times more beta-glucans than using wheat flour alone. Previous industrial experiments show that when more than 20% of barley flour is added, the paste dough becomes grainy, crumbly, and difficult to roll, has uneven surface, thus, the addition of additional ingredients to obtain a flexible dough should also be considered.





"Kornelija" flour can also be used to increase the nutritional value of **yoghurt** and ensure optimal consistency: the proportion of proteins and carbohydrates increases, the content of fibres increases significantly, the viscosity of the product and the organoleptic evaluation improve. The optimal addition of barley "Kornelija" flour for the preparation of yoghurt is 2%, but when using germinated grain flour for 24 and 36 hours – 3%. The observed number of lactic acid bacteria in the product (not less than 7 Lgkvv/ml) indicates a more intensive development of lactic acid bacteria, as well as a shorter fermentation time is required.



"Kornelija" flour is excellent for making **sweet or savory snacks**. For example, 60% of this variety of flour was used to make barley-vegetable-berry snacks. This gave the product extra nutritional value and a particularly high fibre content.

In order to prevent the product from developing an atypical salty taste, it is recommended to use heat-treated (sprouted (germinated), roasted, extruded) barley flour, supplementing it with various fruits, berries, vegetables, syrups, honey, oat flakes.



'Kornelija' barley flour is ideal for the production of semi-finished (prefabricate) mixtures. For example, by combining barley flour with extruded pea flakes, adding spices and water, one can make dough for baking scones. The optimal ratio of the mixture is 70% of pea flakes and 30% barley flour, the resulting product contains 18.2% protein, 1.7% fat, 11.1% dietary fibre, including 2.0% beta-glucan, and this ratio of legumes/cereals provides the body with the necessary amino acid composition.

### Chemical composition of hulled barley 'Kornelija' in different grain production places in 2018-2020

Parameter	Stende (Northern Kurzeme (Kurland))	Stende (Northern Kurzeme (Kurland))	Estonia	Lithuania	Stende (Northern Kurzeme (Kurland))	Farm Krastmali (Southern Kurzeme (Kurland))	Farm Kanepites (Vidzeme)	On average
	2018	2019			2020			
Energy value, kJ/kcal	1418/ 336	1563/ 371	1602/ 368	1568/ 372	1637/ 389	1552/ 369	1609/ 382	1567/ 372
Protein, %	20.84	16.4	15.5	16.4	14.8	15.5	12.9	15.4
Fat, %	2.1	2.5	2.6	2.4	2.5	2.4	2.3	2.4
Starch, %	47.9	60.0	60.7	60.4	62.5	59.1	65.3	60.3
Sugars, %	1.9	1.0	1.3	2.2	1.0	-	-	1.3
Fibre	17.4	19.5	23.4	17.0	26.8	-	-	21.7
β-glucans, %	6.2	4.9	5.6	5.5	5.6	5.4	4.6	5.2
Phenol compounds,	-	-	-	-	250	230	280	253
NA, %	51	43	36	35	34	39	39	-
NA/P, %	25	26	27	28	22	24	27	-

NA – content of essential amino acids in grains; NA/P – content of essential amino acids in protein

More information about individual technologies [www.kornelija.lv](http://www.kornelija.lv), [www.arei.lv](http://www.arei.lv)