

# Gluten Free Beer from Unmalted Oats

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## **ABSTRACT**

Normally gluten free beer is produced either from cereals that are not native to the Danish climate, or by adding enzymes during malt based beer production, which destroys the gluten complex. A cereal that has been discussed lately, as a safe cereal for people suffering from either celiac disease or gluten intolerance is oats. Furthermore oats have a high resistance to most pests that can infest crops such as barley and wheat. Oats is also generally sold at lower prices than barley and wheat.

When producing a beer containing gluten, the cereals used in the process are malted to activate the production of enzymes. These enzymes are needed to break down the starch inside the endosperm into fermentable sugars. Malting is a costly procedure, both for the environment and economically. The cost of malted grains is close to four times higher than unmalted grains.

Another potential problem if malting grains which do not contain gluten, e.g. oats is the contamination with gluten from other grains. Since the malting takes place at the same production line, a thorough cleaning of the equipment must be done, to avoid gluten contamination. Which besides the environmental impact of malting itself, would further increase the carbon footprint, if one was aiming for a gluten free product.

Most breweries would find it difficult to produce a beer solely from oats as it does not contain husk, which makes it hard to separate the wort from the residual oats after mashing. The technology made available at DTU Brewery, together with the enzyme Ondea Pro<sup>®</sup> (Novozymes, Bagsværd), yields the possibility of a 100 % unmalted oat beer.

The project has focused on the production of 3 different beers all showing potential as a gluten free alternative for the market. Our research indicates that a beer made, following our recipes, is gluten free and hereby, both a safer choice for people with gluten intolerance and celiac disease, and, as well, a greener choice.