BIOCATALYSTS | BRAIN Biotech Group

Plant-based

# Smooth and Naturally Sweet: Improving Oat-Based Drinks with Enzymes

Oat drinks aren't a one-size-fits-all product. Some consumers want a light, refreshing drink for everyday use, while others expect a richer, creamier texture for coffee and barista applications. Achieving these differences consistently requires precise control over starch and fibre behaviour. The functional behaviour of oats during beverage production is dominated by two key components: starch and β-glucans. Without intervention, high concentrations of these macromolecules result in excessive viscosity, gelling, and phase instability, all of which limit processing efficiency and compromise consumer acceptability.

## The Secret to a Creamy, Consistent Pour

The controlled application of fungal and bacterial α-amylases and β-glucanase, used individually or in unique combinations, can enable the precise tailoring of oat beverages' rheology and stability. Heres how they work:

α-Amylase hydrolyses internal α-1,4-glycosidic bonds in gelatinised starch, reducing molecular weight and thereby lowering viscosity. By modulating α-amylase dosage, manufacturers can produce oat bases ranging from lower viscosity, light-bodied beverages to more structured matrices suitable for fortified or higher-solids formulations.

β-Glucanase cleaves β-1,3 and β-1,4 linkages in soluble β-glucans, mitigating gel formation and sedimentation without fully removing these fibres, which remain desirable for nutritional value. Adjusting activity levels allows for fine control over mouthfeel - from thin, refreshing profiles to denser, barista-style textures that support foaming and layering in coffee applications.

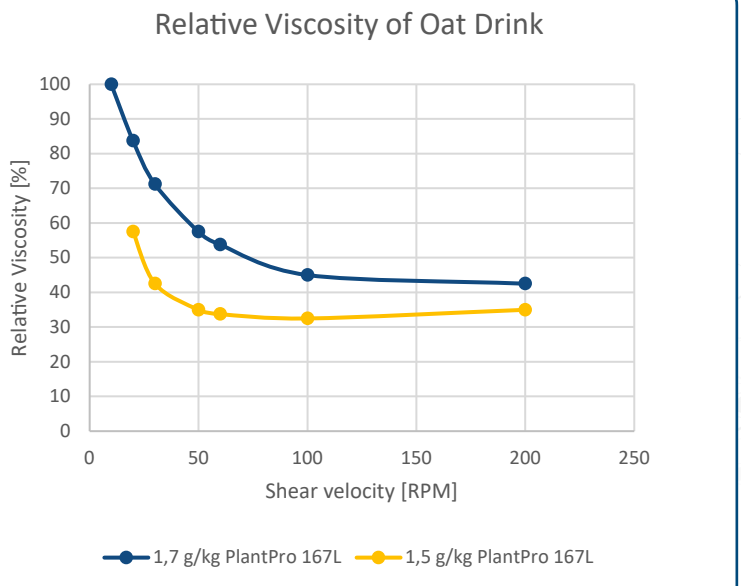


**Figure 1 –** Relative viscosity curve [%] over shear velocity [RPM] for different oat drink samples produced using (i) 1.7g/kg PlantPro™ 167L, and (ii) 1.5g/kg PlantPro™ 167L for 60 minutes at 65°C.

Viscosity is a key driver of both sensory quality and processability in oat drink production, and even subtle changes in enzyme dosage can significantly influence the final product texture. In trials where the levels of bacterial α-amylase and β-glucanase were held constant, varying the dose of PlantPro™ 167L (a fungal α-amylase) showed a clear impact on the structural profile of the oat drink. As shown in Figure 1, higher dosages of PlantPro™ 167L resulted in increased viscosity and a creamier mouthfeel, making it ideal for richer, barista-style applications. In contrast, lower dosages produced a thinner, more fluid beverage suited to light, ready-to-drink formats. This controlled approach to enzyme application enables manufacturers to fine-tune viscosity and texture without relying on added stabilisers, while also supporting consistent processing, filtration, and end-product performance. The optimal texture depends not only on enzyme ratio and activity but also on the composition of the starting oat flour material.

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# The Sweet Spot: Balanced Flavour Without Added Sugar

Consumer preferences for sweetness, nutrition, and energy release are becoming increasingly diverse with some favouring naturally sweet oat drinks for flavour, while others seek low-Glycaemic Index (GI), unsweetened options for health and blood sugar management. These differences can be addressed by controlling the sugar profile, which is defined by the Degree of Polymerisation (DP); a measure of how many glucose units are linked together in a carbohydrate molecule. For example, maltose (DP2) consists of two glucose units, and maltotriose (DP3) has three; the higher the DP, the less sweet and more slowly digested the sugar. Through enzymatic hydrolysis, enzyme dosage and reaction time can be adjusted to influence this distribution, producing oat drinks with a low-glucose, mildly sweet profile ideal for glycaemic-friendly or unsweetened formulations.

While not intended for full saccharification, the controlled enzymatic breakdown of oat starch offers significant flexibility in shaping the carbohydrate profile of oat drinks. Figure 2 displays, varying combinations of a bacterial α-amylase, a β-glucanase and a fungal α-amylase to produce distinct sugar profiles, enabling the development of both mildly sweet, low-glucose formulations for glycaemic-conscious consumers and naturally sweeter products with enhanced flavour and clean-label appeal.

This approach empowers manufacturers to meet a broad range of nutritional as well as sensory preferences, making enzyme-driven sugar profile optimisation a powerful tool for delivering oat drinks that are both commercially competitive and nutritionally aligned.

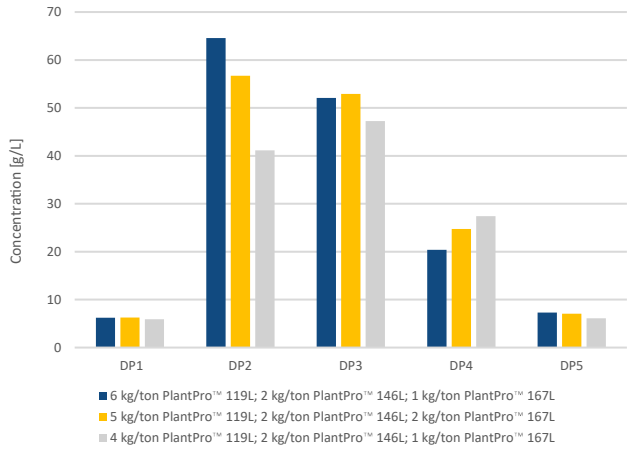


**Figure 2 –** Sugar profile (DP1 - DP5) of oat drinks produced using different ratios of bacterial α-amylase, β-glucanase and fungal α-amylase for 60 minutes at 65°C.

## PlantPro™ 119L

Classical bacterial α-amylase for plant-based beverages production. It efficiently liquefies starchy substrates, rapidly reducing viscosity to create a smoother texture, converting starches into soluble dextrins with trace amounts of maltose and glucose.

## PlantPro™ 146L

Classical β-glucanase for plant-based beverages production. Breaks down β-glucans and hemicelluloses, reducing viscosity, enhancing filtration, and aiding starch degradation.

## PlantPro™ 167L

Classical fungal α-amylase for plant-based beverages production, breaking down starches to produce soluble dextrins and maltose and reduce viscosity.

## Your Vision, Our Expertise: Partnering for optimal solutions

Have a specific taste or texture in mind? We can work with your oat flour and process conditions to identify the right enzyme combination to meet your product goals. Our technical team offers hands-on support to fine-tune viscosity and sweetness - helping you deliver oat drinks that perform and delight.