



**RONOZYME®**  
**MultiGrain**  
Multiply the benefits

dsm-firmenich 

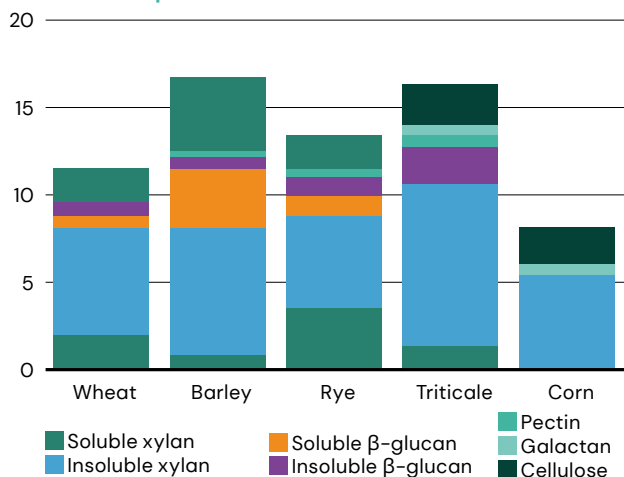
# RONOZYME® MultiGrain: multiply the benefits

RONOZYME® MultiGrain is an innovative thermostable multicomponent carbohydrase from DSM derived from *Trichoderma reesei*. It contains a complex range of different activities, of which **xylanase (endo-1,4-β-xylanase; EC 3.2.1.8) and β-glucanases (endo 1,3 (4)-β-glucanase; EC3.2.1.6 and endo-1,4-β-glucanase: EC 3.2.1.4) are guaranteed activities. It also contains beneficial side activities such as xyloglucanase & arabinoxylan de-branching activities.**

## Understanding the difference of cereal fiber compositions

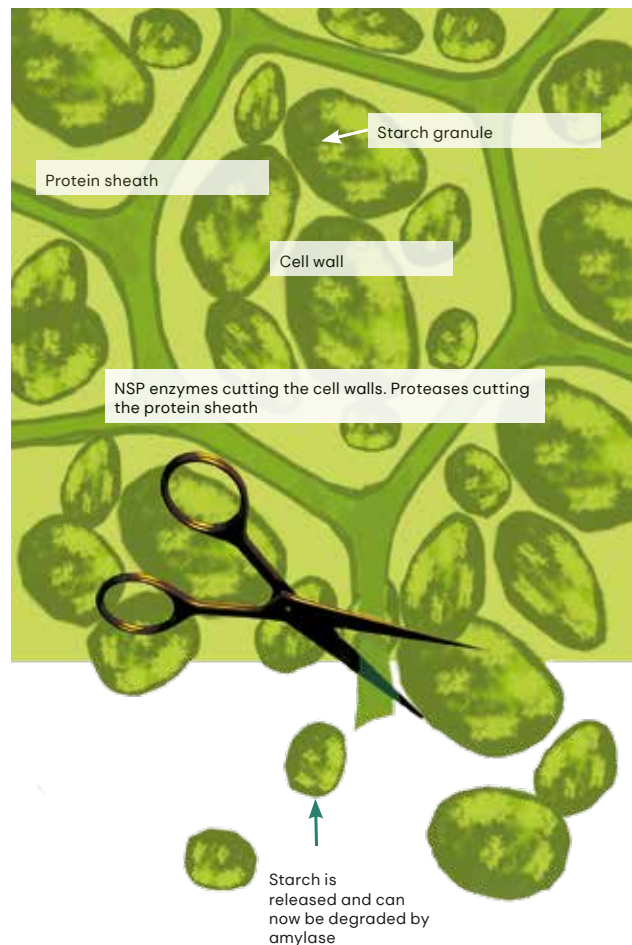
In cereals, the outer layer and the cell wall are mainly made up of arabinoxylans and β-glucans. The exact composition of these varies from cereal to cereal. Wheat, containing mainly soluble and insoluble arabinoxylans requires mainly a xylanase enzyme to degrade the cell wall. However barley contains also high levels of soluble β-glucans which cause high intestinal viscosity. In addition to that arabinoxylan (also called glucuronoarabinoxylan) in corn is heavily fortified with substituents, being more populated than other cereals. Given the complexity of carbohydrates in feed, often more than one carbohydrase activity will be required to maximise the release of entrapped nutrients and reduce the viscosity.

### NSP composition of different cereals



## Reaching the heart of cereals

In cereals, starch and protein are stored in the endosperm. To access and utilize the starch and protein the animal must break down the cell wall. Physical processing of feed ingredients, such as mechanical grinding, is the most common method utilized to break down and to reduce the number of intact cell walls. Even with fine grinding, some cell walls will remain intact, which means the nutrients remain largely inaccessible to the animal. Addition of exogenous carbohydrases can be viewed as chemical grinding and will increase the extent of cell wall breakdown and improve the availability of starch and other nutrients.



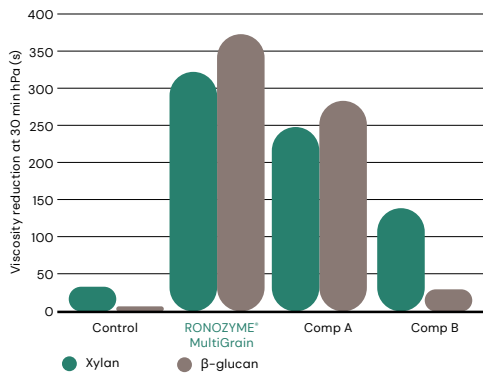
## RONOZYME® MultiGrain delivers:

- Improved energy utilization
- Flexible formulation
- High performance
- Reduced feed cost
- High retention after pelleting

## The highest viscosity reduction

Cereals high in soluble dietary fibre such as barley, rye, oats and wheat can depress growth in mono-gastric animals on account of an increase in viscosity.

## Ronozyme® MultiGrain gives the highest viscosity reduction

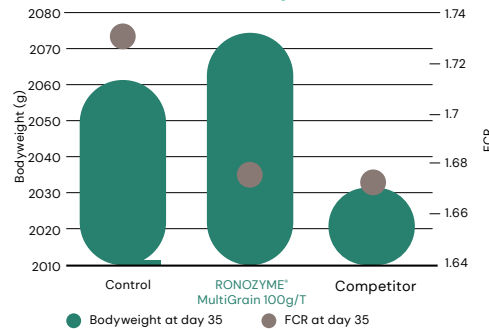


## Flexible formulation resulting in optimal performance

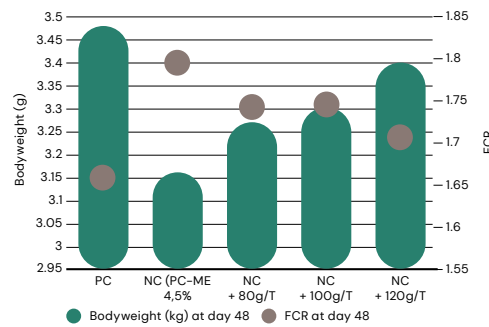
The wide range of activities in RONOZYME® MultiGrain makes it a very efficacious and reliable enzyme to use in various types of diet and species. This allows very flexible formulation, specifically in the case of variable raw material quality or availability.

DSM recommends the use of Digestibility Improvement Factors (DIF) for specific raw materials when applying RONOZYME® MultiGrain in feed formulations. Recent trials in broilers and piglets demonstrate similar or improved performance relative to control diets while realizing substantial cost savings.

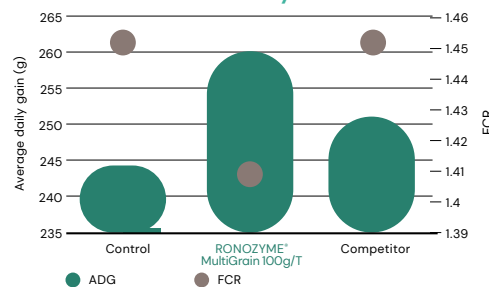
## Growing broiler performance in a wheat/barley-based diet



## Growing broiler performance in a corn-based diet



## Weaned piglet performance in a wheat/barley-based diet

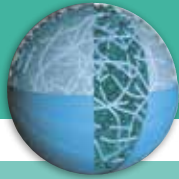


# Optimal product formulation

As the degree and duration of heat processing at feed mills intensifies, enzyme stability has become a key concern. RONOZYME® MultiGrain (GT) recovery throughout the complete feed manufacturing process is excellent. Other benefits of the GT formulation are its dust-free nature and flowability. Both of these advantages contribute to the good mixability in both premixes and feed.

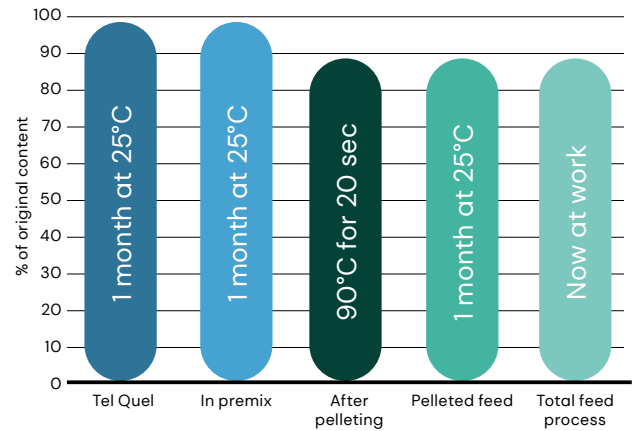
**Comparative testing has shown that RONOZYME® MultiGrain is the most thermostable multicomponent product on the market today**

- Heat-stable up to 90°C
- Free-flowing for accurate dosing
- High particle number for superior homogeneity
- Virtually dust-free for safe handling



**Available also in liquid form for post pelleting or post extrusion application**

## Stable throughout the complete feed process



## Recommended inclusion levels\*

	Recommended dose (ppm)*
Poultry for fattening (broilers-ducks-quails)	100-120
Turkeys for fattening	100-150
Poultry for laying	80-120
Piglets (weaned)	100-150
Pigs & Sows	80-120
Aquatic species	100-200

\* Exact values are dependant on substrate quantity and accessibility. Inclusion rate may vary regarding the application type and product form used. Please contact your DSM Expert to have further information.



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October 2023