



NEWSLETTER

Cereals in Dairy Cow Nutrition: Choosing the Right Starch Source

Cereals are a fundamental component of dairy cow rations, providing the energy required not only by the animal itself but also—and perhaps most importantly—by the rumen microorganisms responsible for feed fermentation and nutrient utilization.

In Italy, **maize** remains the most widely used cereal, whether supplied as maize silage, ground maize, or dry grain. Its popularity stems from both its high energy value and its excellent yield per hectare. However, increasing concerns regarding maize's high water requirements and the recurrent risk of aflatoxin contamination have encouraged nutritionists to explore alternative energy sources in recent years.

Sorghum is often considered the closest alternative to maize, with a nutritional profile that is largely comparable. In contrast, **barley** and wheat contain higher levels of crude protein and fibre but consequently provide lower starch and energy concentrations. Moreover, the ruminal degradability of starch is substantially greater in wheat and barley than in maize and sorghum.

	Maize	Sorghum	Barley	Wheat
CP (% DM)	8.9	10.5	11.2	14.9
NDF (% DM)	12.5	11.0	21.5	14.9
NDF Digestibility (% DM)	79	79	68	68
Starch (% DM)	73.9	73.6	60.0	60.5
Ruminal Starch Degradability (%)	60	60	89	94
Ether Extract (% DM)	4.1	3.3	1.9	1.6
UFL	1.24	1.21	1.09	1.19

Another key factor affecting starch degradability and digestibility is the **particle size of ground cereals**. When cereals are finely ground (<1 mm), differences among grain sources tend to diminish, with starch degradability converging around 75–78%. Conversely, with coarser grinding, the intrinsic differences between cereals become much more pronounced.

Processing methods also exert a significant influence on starch utilization. The highest digestibility values are typically achieved with **steam-flaked grains and high-moisture cereals**, where total starch digestibility commonly reaches 94–96%.

In the case of **maize silage**, total starch digestibility is generally close to 90%, provided that crop dry matter at harvest remains within the optimal range of 32–37%. This highlights the importance of proper ensiling management, from harvest timing through to silo opening, in maximizing the nutritional value of the forage.

Taking these factors into account, when formulating rations for lactating dairy cows, the first consideration in determining the appropriate starch level should be the amount of **forage-derived fibre** available. Total dietary NDF should be calibrated around this parameter. As forage NDF inclusion decreases, NDF supplied by concentrates and by-products should increase accordingly, while dietary starch concentration should be reduced to maintain rumen function and stability.

Regarding the selection of starch sources, **maize and sorghum** can generally be incorporated at higher inclusion rates due to their slower ruminal starch degradation. In contrast, **barley, wheat, and high-moisture cereals** should be used more cautiously, as their rapidly fermentable starch may increase the risk of ruminal pH depression, potentially impairing fibre digestion and compromising rumen health.

Finally, evaluating the actual utilization of dietary starch remains essential. One of the most practical approaches is the **visual assessment of manure**, complemented when possible by laboratory analysis. Residual starch concentration in faeces should ideally not exceed **2–3% of dry matter**, as higher levels indicate reduced starch digestibility and suboptimal feed efficiency.

Ultimately, successful starch nutrition is not simply a matter of maximizing starch inclusion. Rather, it requires balancing starch source, ruminal degradability, processing method, and fibre supply to support rumen health, optimize nutrient utilization, and sustain high milk production efficiency.