

Ra-Rake is the new double wheel rake

The energy and fermentiscibility values of the forage obtained with the double star rake Ra-Rake: confirmation of the scientific data

4 April 2019 by [Repossi Macchine Agricole](#)

Today we continue our commentary on the encouraging scientific results obtained by the team of researchers coordinated by Prof. Rapetti of the University of Milan.



1. ASHES (CEN)

As we have seen (*see press release of March 2019*), forage gathered with Ra-Rake showed an increase in ash content of 5.5 g per kg of dry forage, which is much lower than the increase in ash found with the control rakes, on average 16.4 g per kg of dry matter. The increase in ash is believed to be caused mainly by pollution of forage with soil and stones; so thanks to Ra-Rake

the lower increase (**66% less**) leads to a higher quality crop, for healthier and more productive animals.

Variation	Type of rake	
	Ra-Rake	Other
CEN (% SS)	0,552	1,641
GP (ml/200 mg SS)	-0,328	-1,397
ME (MJ/kg SS)	-0,046	-0,194
NEL (MJ/kg SS)	-0,033	-0,137
UFL (n/kg SS)	-0,004	-0,019

(*SS = Sostanza Secca / Dry matter; CEN = Ceneri / Ashes; GP = Gas Production; ME = Energia Metabolizzabile / metabolisable energy ; NEL = Energia Netta di Lattazione / Net Lactation Energy; UFL = Unità Foraggiere Latte / Milk Forage Units*)

This table averages results of about **300 samples** taken in Italy and Switzerland, in order to assess comparative variations in **chemical composition and energetic value of forage**. During these tests, RA-Rake worked in parallel with rotary rakes and pick-up rakes (merger).

Let's now examine the other values.

2. GAS PRODUCTION (GP)

This figure expresses the **amount of fermentation gas produced by simulating ruminal digestion**. Expressed in mL of gas produced in 24 hours per 200 mg of incubated dry matter, it represents an indirect measure of the quantity of fermented carbohydrates. Since ashes do not cause any production of gas (in fact they do not ferment), the decrease in forage fermentability is substantially due to the increase in ash concentration. In other words, with Ra-Rake, **GP is only reduced by 0.328 because the forage it collects has a lower concentration of ash than the one collected with other rakes**, which loses fermentability for 1.397. This is a further confirmation of the fact that **this forage contains less ash and is therefore of higher quality when compared to the one harvested with other machines**.

3. ENERGY (EM, ENL, UFL)

EM is the metabolisable energy, i.e. **the energy value of the forage** expressed net of faecal, urinary and methane gas energy losses. It is therefore the energy that the animal is able to

metabolize. This amount of energy is then used by its body for the metabolic functions of maintenance and production (eg. milk synthesis) with an efficiency of about 60-65%, while **Net Lactation Energy (ENL) represents the amount of energy contained in the forage**, net of all losses that will occur during the digestive-metabolic process.

UFLs are calculated on the basis of ENL and are no more than a different way of expressing this last parameter, considering that 1 UFL corresponds to 1760 kcal of ENL.

Since the 3 values are in fact related, let's evaluate one of them, UFL.

The reduction in UFL as a result of using Ra-Rake was 0.004 UFL/kg of dry matter; with control rakes, the loss was much higher: 0.019 UFL/kg. In other words, **the forage harvested with Ra-Rake allows the animal to metabolize more energy**, so that it **will need smaller amounts of supplements (e.g. soy-based)**, with **considerable savings for the farmer**.

In a consistent way, tests reveal that the three values - ME, NEL and UFL - (which are always reduced with raking because the processing naturally causes a loss of energy obtainable from the forage), in the harvest produced by Ra-Rake are reduced much less than the data recorded with other machinery, with an **advantage of about 76%**.

Excellent news for farmers and forage producers, both in qualitative and economic terms!

We will shortly be communicating the impact of RA-Rake on cattle productivity, which has important financial consequences on farms and farm budgets.



What is Ra-Rake?

For over a century Reposs Machine Agricole has been designing and producing comb and rotary rakes; the latest addition to the range, **RA-Rake is a revolutionary double-wheel rake**, thanks to which in 2017 the company obtained a prestigious Horizon 2020 funding, launched by the European Union to promote and support innovation, research and technological

development.

The innovation, ingenious but simple, allows farmers to exploit the benefits of wheel rakes without having to bear their negative consequences on forage: according to research by the University of Minnesota, the wheel rake is in fact the fastest and cheapest, but is also the one that collects more stones and soil. In fact, the single wheel, mechanically driven by the clutch with the ground, moves the hay, but in this way pollutes it with a large amount of ash.

Gabriele Reposi, the inventor of the new machine, had the idea of **equipping it with two wheels of different diameters**: the larger one does not touch the forage, but has the sole task of actioning the second smaller wheel, that moves the forage without polluting it with rocks and dirt.

Since the machine does not need complex and expensive mechanisms to move the smaller wheel, it benefits from reduced costs (both for purchase and maintenance) and allows it to operate at high speed, a peculiarity of single-wheel rakes.

Source: Reposi Macchine Agricole srl

