

## HIGHLIGHT

## New plant species with multiple interests for ruminants

The use of dicotyledonous plant species constitutes a strategy for agroecological crop–livestock systems with multiple benefits on both the crop system and the herd. These plant species are likely to improve animal performances and health, decrease nitrogen and methane wastes and improve the quality of animal products as they contain secondary metabolites with beneficial effects. Six dicotyledonous plant species (sainfoin, buckwheat, phacelia, berseem clover, crimson clover and vetch) were grown. Chemical composition and fermentation parameters after *in vitro* ruminal incubation of these plant species were measured and compared with those of lucerne. The present study showed that these plant species hold nutritive characteristics as good as lucerne, demonstrating that they could be suitable for ruminant nutrition. The studied plant species were rich in secondary compounds (tannins, phenolic compounds, carotenoids and tocopherols), especially sainfoin. These compositions in secondary compounds could explain the reduction in methane and ammonia concentration observed with sainfoin, phacelia and buckwheat, and could be involved in the improvement of the nutritional quality of ruminant products.

The use of cover crops have many agronomic and environmental benefits, including improved soil fertility through atmospheric nitrogen fixation, increased soil conservation, weed reduction and improved habitat and feed resources for wild animals and pollinators. Cover crops could also provide additional forages for ruminants as they can be grazed or preserved for use when fodder is scarce. These plant species, especially the dicotyledonous species would hold interesting nutritive value for ruminants. They may also provide ruminants with other benefits as they contain different secondary metabolites (tannins, carotenoids, vitamins, polyphenols...) that are

likely to improve animal performances and health, decrease nitrogen and methane wastes and improve the quality of animal products. To support this hypothesis, the study compared the nutritive value, the composition in secondary compounds and the *in vitro* fermentation parameters of six plant species (sainfoin, buckwheat, phacelia, berseem clover, crimson clover and vetch) commonly used as cover crops. Lucerne was used in the study as a well-known reference plant in terms of nutritive value and ruminal fermentation parameters.



Legend: Sainfoin

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All the plant species tested hold a good nutritive quality in term of crude protein content and *in vitro* organic matter digestibility. We also showed that the energy (UFL) and protein (PDI) values of these plant species estimated with the INRA (2018) feed system were as good as those of lucerne. This highlights that these cover crops could be suitable for ruminant nutrition. The study also demonstrated that buckwheat, sainfoin and phacelia modified rumen-fermentation patterns, including a reduction in methane and ammonia production; these reductions may be due to their concentrations of tannins and phenolic compounds. Furthermore, the composition of phenolic compounds differed between species. Inversely, the carotenoids and tocopherols compositions were similar between species and all plant species were rich in carotenoids (including the vitamin A precursors). Among the plant species studied, sainfoin contained the most secondary compounds, including the highest concentrations of carotenoids and tocopherols, and among those with the richest concentrations of phenolic compounds. Buckwheat and berseem clover had also an overall interesting secondary-compounds profile.

These results constitute a first step towards a recommendation to use cover crops as fresh forage. Moreover, these new plant species were classified according to criteria other than feed value, demonstrating the interest in characterising the composition in secondary compounds to assess these criteria. Additional works are required to confirm the viability of these cover crops for use as forage for ruminants, by evaluating intake and animal performances. Moreover, the availability of these secondary compounds needs to be explored in conserved forages such as hay and silage.

#### Valorisation:

Maxin G., Cornu A., Andueza D., Laverroux S., Graulet B. (2020) Variation in secondary compounds composition of cover crops used as alternative forage for ruminants. *Journal of Agricultural and Food Chemistry* 68, 6286-6296.

Maxin G., Graulet B, Le Morvan A, Picard F. Portelli J Andueza D. (2020) Evaluation at two phenological stages of the potential valorisation as forages for ruminants of plants usually used as catch crops. *Animal Production Science* 60(6) 823-832.

#### Learn more:

INRA, 2018. INRA feeding system for ruminants. Wageningen Academic Publishers, Wageningen, the Netherlands, 640 pp., DOI : 10.3920/978-90-8686-292-4

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