



#### Keywords

Agrifood wastes, Antioxidant capacity, Phenolic compounds, Functional feed

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# Valorisation of agri-food wastes and by-products as animal feed: digestibility, polyphenolic content and antioxidant capacity

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## Abstract

Agri-food wastes (AFW) and by-products can have the potential to be reprocessed as animal feed ingredients (Bampidis, *et al.*, 2006). The aim of this study was to determine the *in vitro* digestibility (IVD), the total phenolic content and the antioxidant capacity of 12 samples of AFW and by-products. The IVD was assessed in all samples considered with the method developed by Regmi *et al.* (2009). Moreover, the total phenolic content and the antioxidant capacity were tested using two different extraction methods: chemical extraction and *in vitro* physiological extraction, simulating monogastric digestion. Further, the polyphenolic content was assessed by Folin-Ciocalteu assay (Attard, 2013) while antioxidant capacity was determined by 2, 2-Azino-bis-3 ethylbenzothiazoline-6-sulfonic Acid (ABTS) assay. Soy and wheat samples were included as controls in all the experiments performed. The results showed that the IVD values ranged from 80 to 90% DM for AFW and from 66 to 98% DM for the by-products. Among AFW and by-products considered, the grape marc exhibited the highest polyphenolic content with a value of 4.5% w/w, followed by Camilina sativa cake (1.3%w/w), olive pomace (0.7% w/w), AFW (1.3% w/w), orange (1.6% w/w) and strawberry dried (1.3% w/w). The grape marc showed a significantly ( $P<0.05$ ) higher ABTS value (573.6  $\mu\text{mol}$  Trolox equivalent/g) compared to the other studied samples. The *in vitro* physiological extraction yielded high polyphenolic content and antioxidant capacity, suggesting that during the digestion the bioaccessibility of phenolic and antioxidant compounds was improved. The results obtained in this study indicate that AFW and by-products are relatively high digestible and they may represent a source of antioxidants and phenolic compounds when used as feed.

Acknowledgments: This research was supported by Fondazione Banco Popolare di Lodi.

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