

[Back](#)

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Prediction of silage composition and organic matter digestibility
from herbage composition and pepsin-cellulase solubility

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Abstract

A dataset of grasses and respective silages was collected by systematically varying the harvesting time in primary growth ($n = 27$) and in regrowth ($n = 25$). The swards were mixtures of timothy and meadow fescue. The grasses were ensiled unwilted with formic acid. Fixed or mixed regression procedure of SAS was used to investigate the relationships between composition of grasses and respective silages and to develop regression equations for predicting silage in vivo organic matter digestibility (OMD) from herbage pepsin-cellulase organic matter solubility (OMS). The silages were well preserved showing only limited amounts of secondary fermentation products. The silage dry matter (DM), crude protein and neutral detergent fibre contents could be estimated relatively accurately from grass variables as judged by relatively small prediction errors ($RMSE_{mixed} = 3.6, 8.1$ and $18 \text{ g (kg DM)}^{-1}$, respectively). The average OMS of grasses was significantly higher than that of respective silages (779 vs. $756 \text{ g (kg DM)}^{-1}$, $P < 0.001$). However, silage OMD was equally accurately predicted from grass and silage OMS ($RMSE_{mixed} = 15.1$ and $15.8 \text{ g (kg DM)}^{-1}$, respectively). When predicting silage OMD from OMS, specific equations should be used for primary growth and regrowth silages, because the slopes and intercepts of correction equations were numerically though not statistically significantly different. It is concluded that silage composition and digestibility can be reliably predicted from herbage characteristics provided that silages are well preserved with moderate ensiling losses.

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