

Sodium hydroxide enhances extractability and analysis of proanthocyanidins in ensiled sainfoin (onobrychis viciifolia)

Article

Accepted Version

Ramsay, A., Drake, C., Grosse Brinkhaus, A., Girard, M., Copani, G., Dohme-Meier, F., Bee, G., Niderkorn, V. and Mueller-Harvey, I. (2015) Sodium hydroxide enhances extractability and analysis of proanthocyanidins in ensiled sainfoin (onobrychis viciifolia). Journal of Agricultural and Food Chemistry, 63 (43). pp. 9471-9479. ISSN 1520-5118 doi: 10.1021/acs.jafc.5b04106 Available at <https://centaur.reading.ac.uk/46385/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1021/acs.jafc.5b04106>

Publisher: American Chemical Society

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the [End User Agreement](#).

www.reading.ac.uk/centaur

CentAUR

Central Archive at the University of Reading

Reading's research outputs online

SUPPORTING INFORMATION

Table S1. Analysis of variance for proanthocyanidin parameters using reaction times of 5 to 60 min and 0.5 to 4.0 M NaOH concentrations.

Sources	df	F-value	<i>P</i>
PA			
Time	3	21.1	0.001
NaOH	4	4.7	0.008
NaOH x Time	12	0.6	0.796
mDP			
Time	3	37.2	< 0.001
NaOH	4	24.6	< 0.001
NaOH x Time	12	5.7	< 0.001
PD %			
Time	3	10.6	< 0.001
NaOH	4	5.9	0.002
NaOH x Time	12	0.9	0.494
Cis %			
Time	3	59.8	< 0.001
NaOH	4	16.2	< 0.001
NaOH x Time	12	1.2	0.364

PA: proanthocyanidin content; mDP: mean degree of polymerization; PD %: molar percentage of prodelphinidins; *cis* %: molar percentage of *cis*-flavan-3-ols).

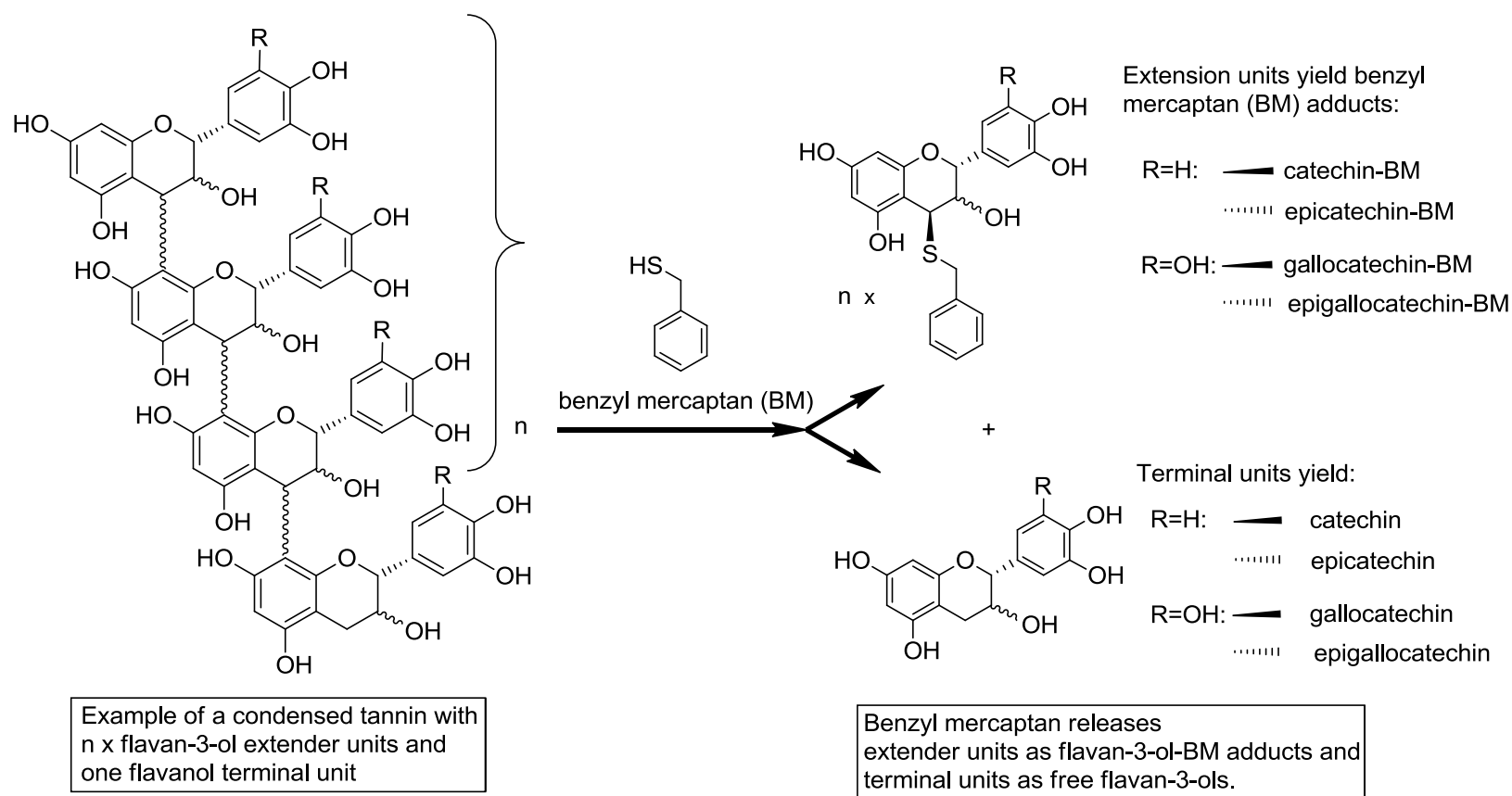


Figure S1. Thiolytic degradation of proanthocyanidins with benzyl mercaptan (Note: extension units of catechin and gallocatechin are released as the 3,4-*cis* and *trans* adducts).¹⁰

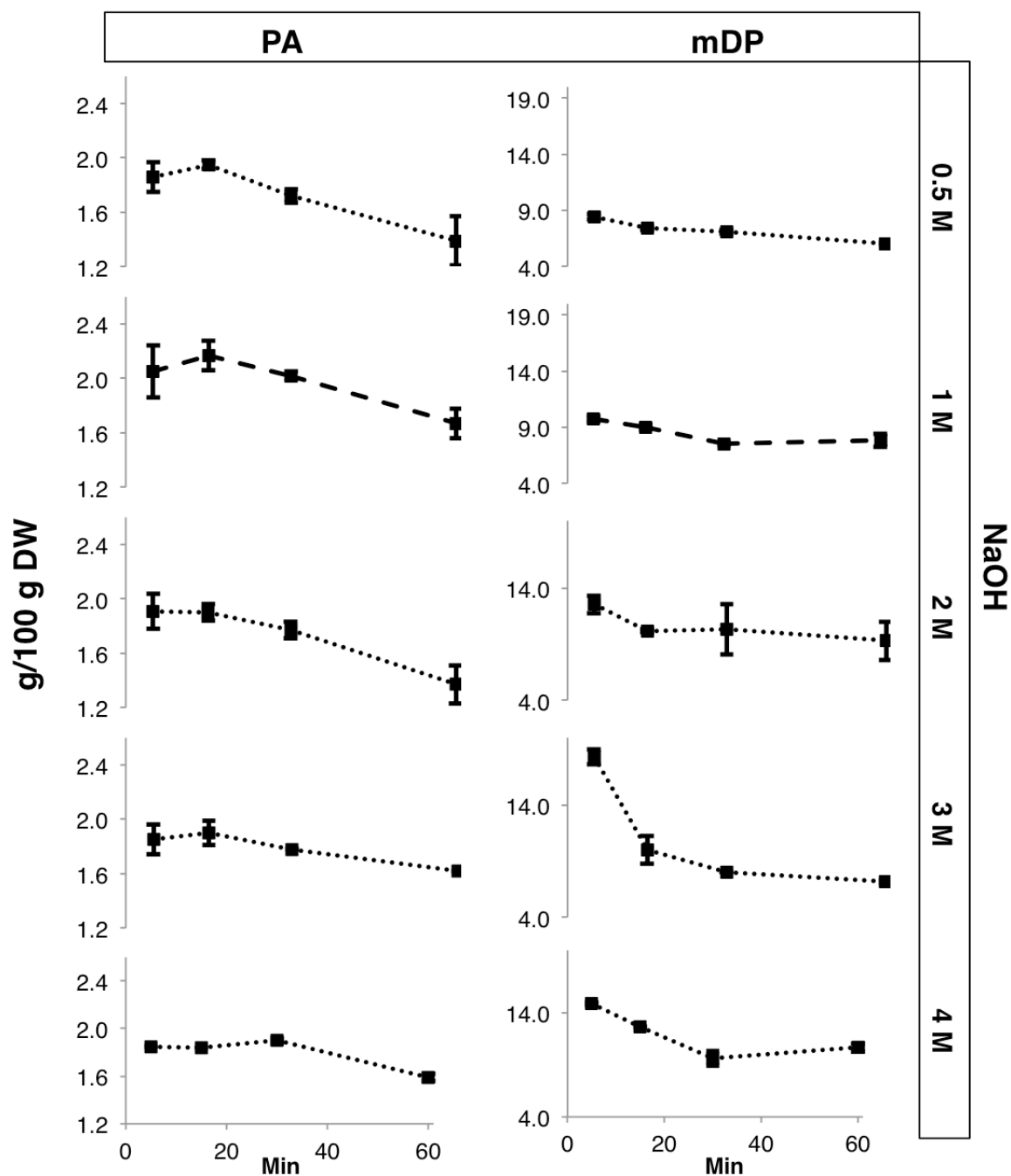


Figure S2. Changes in proanthocyanidin (PA) contents and mean degrees of polymerization (mDP) in sainfoin silage treated with different NaOH concentrations over a 60 minutes period at 40 °C followed by thiolysis with benzyl mercaptan and LC-MS analysis. Dashed lines include the chosen parameters (1 M NaOH, 15 minute reaction time).

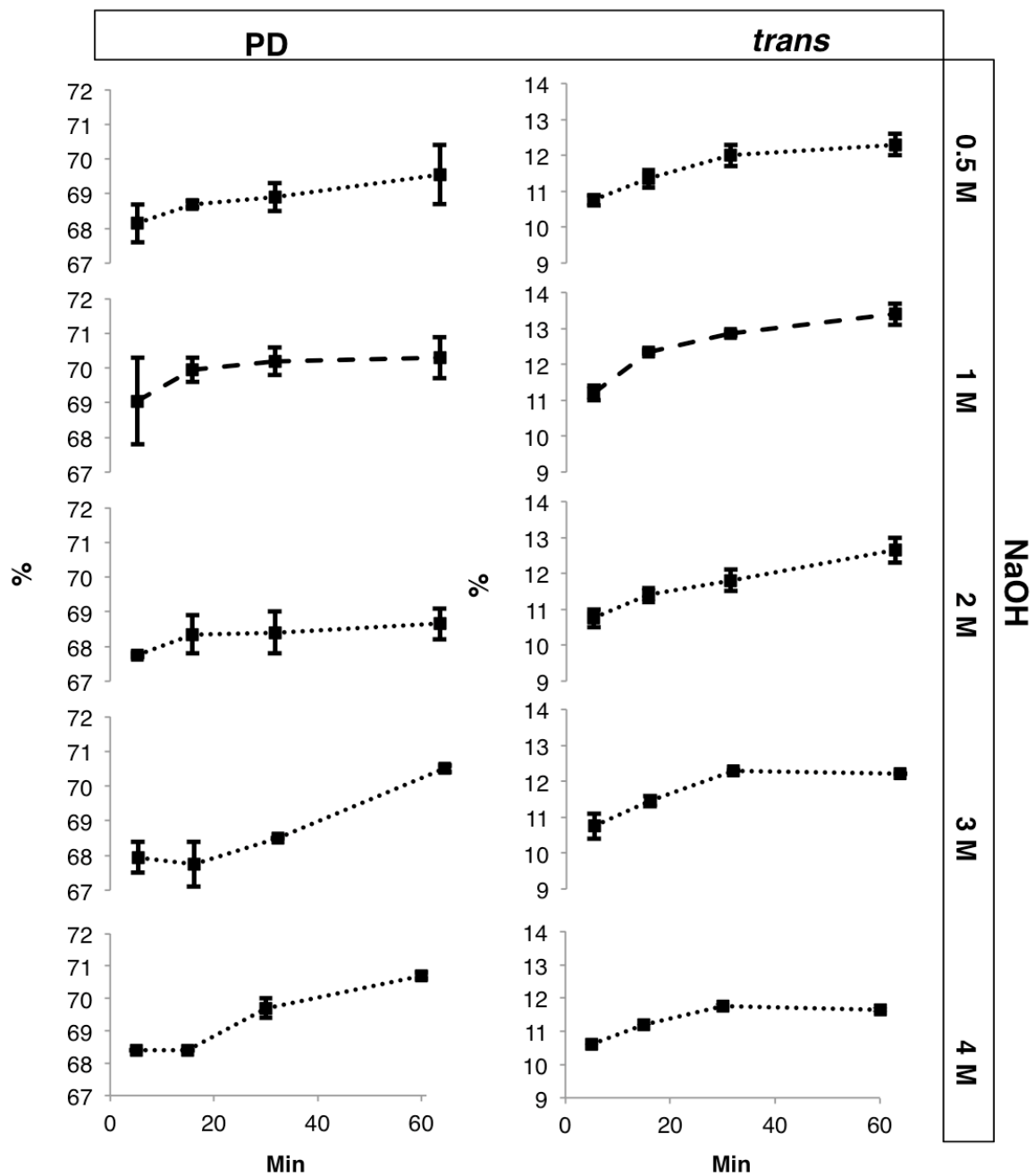


Figure S3. Changes in molar percentage of prodelphinidins (PD) and *trans* flavan-3-ols (*trans*) in sainfoin silage with different NaOH concentrations over a 60 minute time period (dashed lines include the chosen parameters of 1 M NaOH and a 15 minute reaction time).

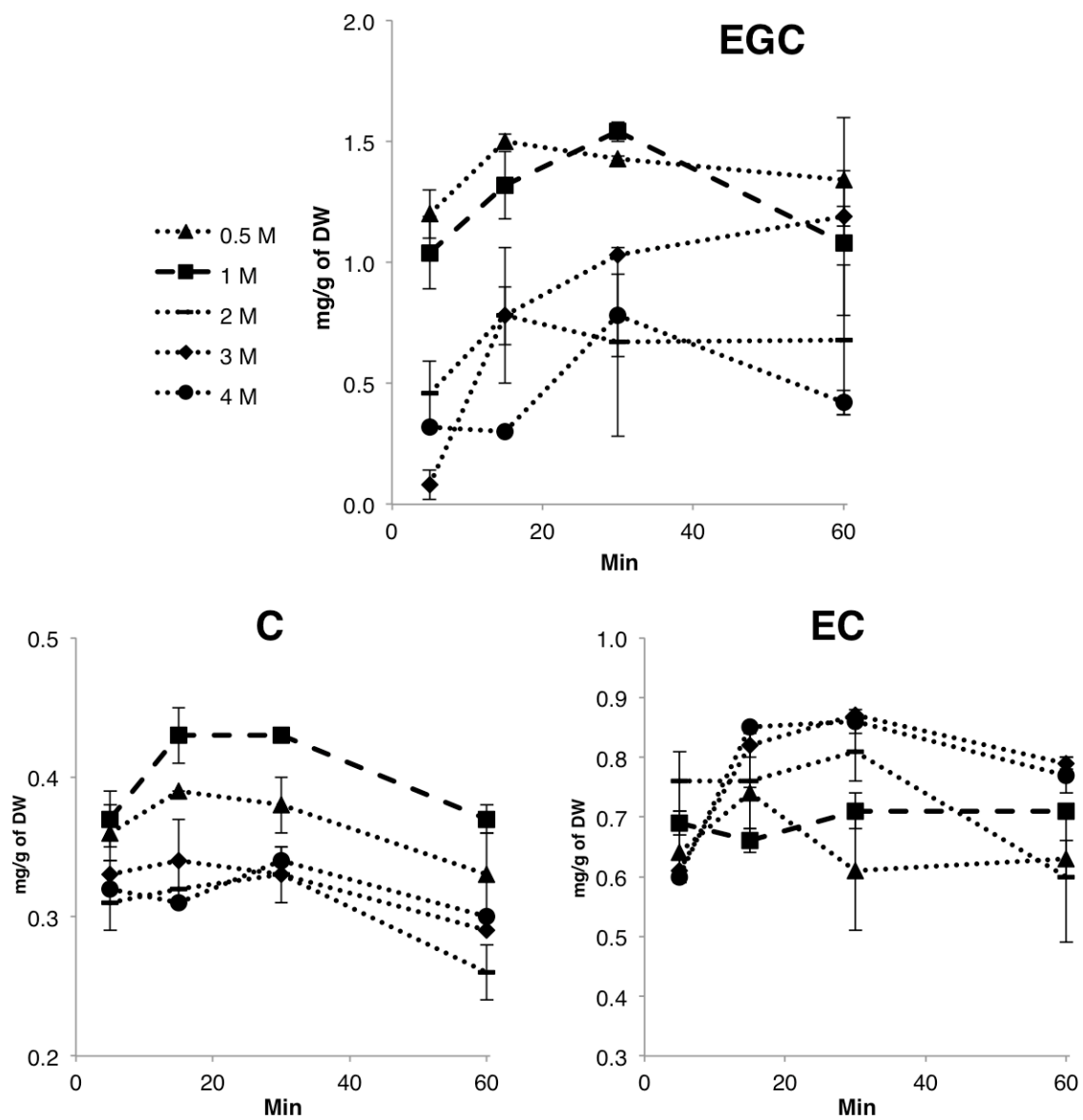


Figure S4. Changes in flavan-3-ol terminal units (mg/g of dry weight) in sainfoin silage. C: catechin; EC: epicatechin; EGC: epigallocatechin.

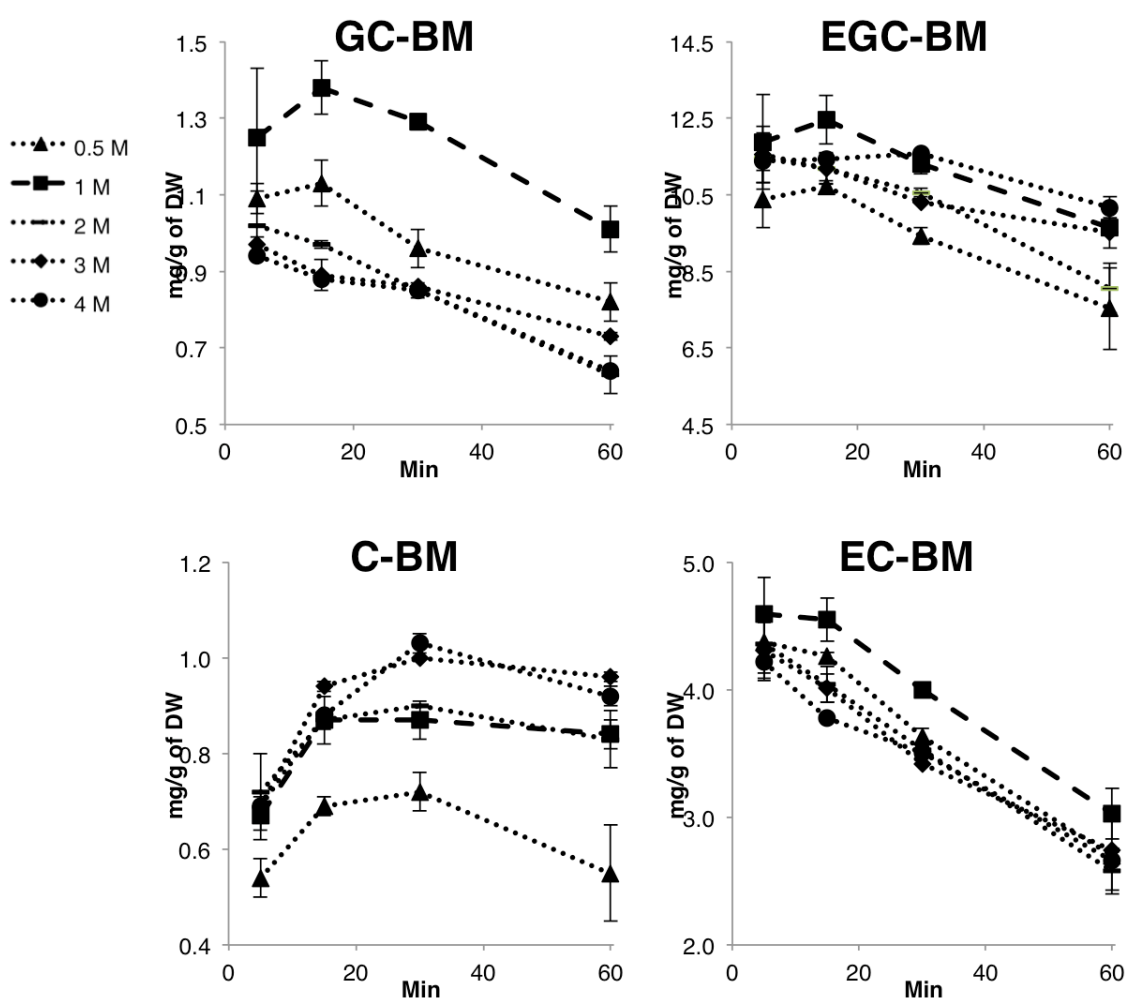


Figure S5. Changes in flavan-3-ol extension units (mg/g of dry weight) in sainfoin silage. BM: benzyl mercaptan adduct; C: catechin; EC: epicatechin; GC: galliccatechin; EGC: epigallocatechin.

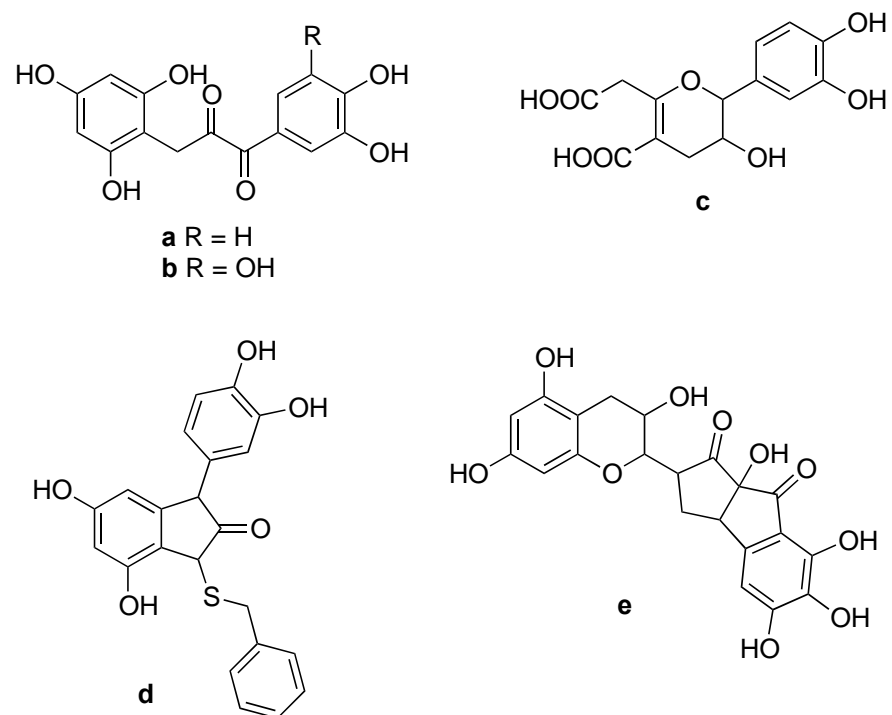


Figure S6. Tentative assignments of some reaction products obtained after NaOH pre-treatment and thiolysis of a pure proanthocyanidin fraction from sainfoin (see Figure 2 for peaks labeled a to e).