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Conference of the Australian
Society of Animal Production**

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ANIMAL PRODUCTION IN AUSTRALIA

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Volume 30

Harnessing the Ecology and Physiology of Herbivores

Edited by
S. Hatcher, G.L. Krebs and B.W.B. Holman

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Effect of Mediterranean Forages on Polyphenol Content and Antioxidant Capacity of Goat Milk

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The ruminant diet plays a major role on modulating a healthy profile of milk bioactive compounds. Forages have been shown to be a good source of polyphenols, having antioxidant properties (Silanikove *et al* 2010). The aim of the study was to characterize polyphenol contents of 7 forages grown in the Mediterranean area in order to estimate their potential contribution to increase the level of bioactive compounds and antioxidant capacity in milk.

Thirty-five homogeneous Derivata di Siria goats were allotted to 7 groups and fed with: *Festuca arundinacea*, *Hordeum vulgare*, *Triticum secale*, *Pisum sativum*, *Trifolium alexandrinum*, *Vicia sativa* and *Vicia faba minor*. Forages were harvested at the phenological stage commonly used in Southern Italy for grazing. Each experimental period lasted 11 days. The housed goats received the scheduled forage *ad libitum*. Forage and milk samples were taken in the last 3 days of the each experimental period and forage intake was detected. In forage species total, tannic (TP) and non tannic (NTP) polyphenol contents were measured (Makkar *et al* 1993). In milk total and free (FP) polyphenol contents (Santiago-Arteche *et al* 2012) and total antioxidant capacity (TAC) (Benzie and Strain 1996) were determined. Statistical analysis was carried out by ANOVA procedure and means were compared by Tukey-test. Pearson's correlation coefficients were calculated.

Milk FP content and TAC were affected by forages (Table 1). *T. alexandrinum* had the highest FP content and *F. arundinacea* had the highest TAC value. Milk TAC showed a relation with NTP intake, as suggested by the correlation between NTP intake and TAC ($r=0.72$; $P < 0.001$). This result could be explained by the ability of NTP to reach the mammary gland, while TP are not absorbed and transported to other tissues, because of their high molecular weight and resistance to degradation (Jimenez-Ramsye *et al* 1994). The potential of natural dietary bioactive compounds to enhance polyphenols and antioxidant activity in goat dairy products was observed in Sulla forage and shrubby vegetation, respectively (Hilario *et al* 2010; Di Trana *et al* 2013).

Among forages, *T. alexandrinum* and *F. arundinacea* were shown to enhance the milk polyphenol content and the antioxidant capacity, respectively. As polyphenols and other healthy beneficial compounds occur largely in forages, further studies are required to highlight their possible relationships and their transfer from diet to milk.

Table 1. Effect of forage species on dry matter and polyphenol intake (g/day), milk polyphenol content ($\mu\text{g/mL}$ gallic acid equivalent) and milk total antioxidant capacity (TAC, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ μM)

	<i>Festuca arundinacea</i>	<i>Hordeum vulgare</i>	<i>Pisum sativum</i>	<i>Trifolium alexandrinum</i>	<i>Triticum secale</i>	<i>Vicia faba minor</i>	<i>Vicia sativa</i>	SEM
Dry matter intake	1377 ^a	1059 ^e	1157 ^c	1129 ^{cd}	1091 ^{de}	1123 ^{cd}	1221 ^b	13.4
Total polyphenols forage	9.33 ^b	1.90 ^f	6.65 ^d	2.01 ^f	4.89 ^e	15.82 ^a	8.03 ^c	0.06
Non tannic polyphenols	8.11 ^a	1.48 ^d	4.74 ^b	1.14 ^e	1.50 ^d	2.42 ^c	1.37 ^d	0.04
Tannic polyphenols	1.22 ^e	0.42 ^g	1.91 ^d	0.88 ^f	3.39 ^c	13.40 ^a	6.66 ^b	0.03
Total polyphenols milk	340.2	332.6	332.0	324.4	349.0	308.0	323.2	9.6
Free polyphenols	48.5 ^b	54.7 ^{ab}	54.2 ^{ab}	58.3 ^a	54.9 ^{ab}	53.8 ^{ab}	48.5 ^b	1.5
TAC	449.5 ^a	314.3 ^{bc}	388.8 ^{ab}	244.9 ^c	276.1 ^c	284.8 ^{bc}	322.9 ^{bc}	25

a, b, c, d, e, f, g: Means with different letters within the same row differ for the $P < 0.05$.

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