Variation in polyphenolic compounds in forages: amount and composition

A. Reynaud[1]

A. Cornu[1], D. Fraisse[2], J.M. Besle[1], A. Farruggia[1], M. Doreau[1], B. Graulet[1]

[1]INRA UR 1213 Herbivores, Site de Theix, 63122 St Genès Champanelle, France

[2]Laboratoire de Pharmacognosie, Faculté de Pharmacie, 63000 Clermont-Ferrand, France

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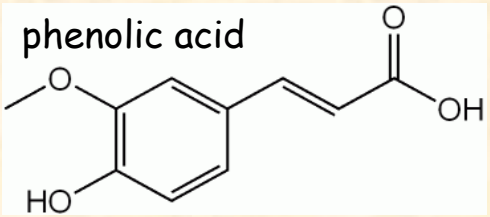
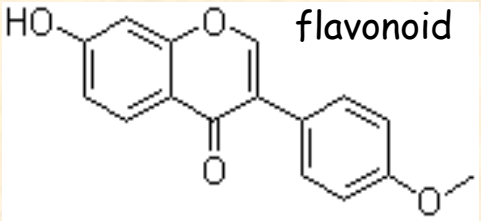
Polyphenolic compounds:

▲ a complex group





▲ some interesting properties

▲ significant contents in forages (30 g.kg^{-1} DM, upland permanent pasture)

Fraisse *et al.*, 2007

▲ a potential beneficial effect on human health after their transfer in milk

▲ little is known: sources of variability in cow's milk => nature of forage?

▲ Aim of this study: evaluate the variation in polyphenolic compounds in the 2 main forages (maize silage and grass)+ fresh grass: effect of level of floristic diversity

Increasing floristic diversity

4 temporary pastures (level of floristic diversity: L1)	4 permanent pastures (level of floristic diversity: L2)	4 permanent pastures (level of floristic diversity: L3)	
Species 10±1	25±3	42±3	p<0,01

4 maize silages

✓ Collected samples: June 2007

✓ Area: Isère, France

Pasture samples:

- Botanical composition of the grazed pasture

Pasture/ maize silage samples:

- Polyphenolic compounds (Folin-Ciocalteu/ LC-DAD-ESI-QToF)

Exact mass

Absorbance spectrum

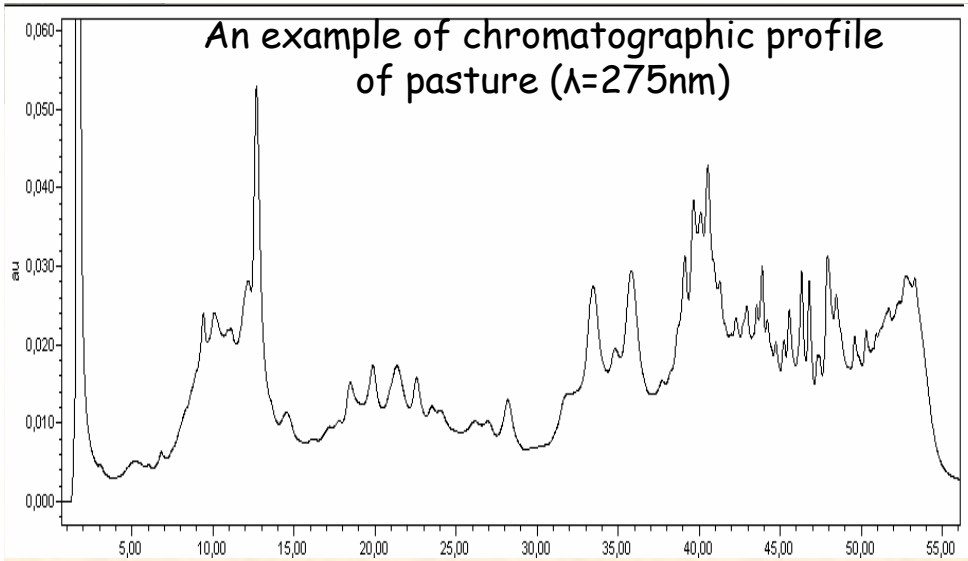
In-source fragments

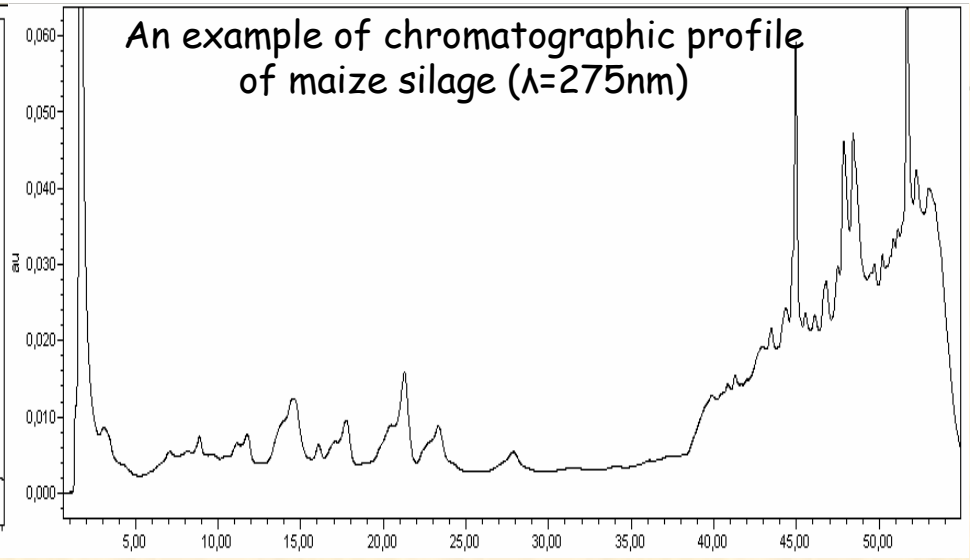
Separation

Pasture/ maize silage samples:

- Polyphenolic compounds (Folin-Ciocalteu/ LC-DAD-ESI-QToF)

Total content



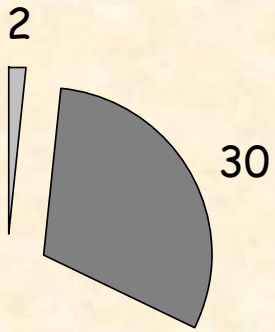


Global analysis of chromatographic /colorimetric data

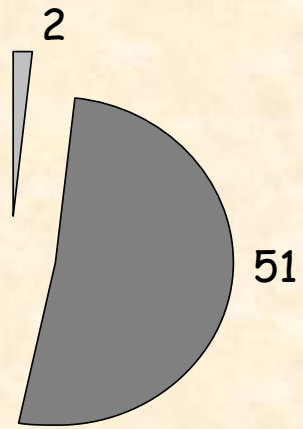
	Pastures (level 1)	Pastures (level 2)	Pastures (level 3)	Maize silages
Number of peaks p=0,001	**48** ± 1.2[a]	**51** ± 1.6[a]	**52** ± 1.8[a]	**42** ± 0.4[b]
Total content in PC (g.kg^{-1} DM) p=0,1	**10.1** ± 4.2	**10.2** ± 1.9	**14.6** ± 3.4	**3.5** ± 0.3
Total content in PC Eq gallic acid (g.kg-1 DM) p<0,001	**5.0** ± 0.6[b]	**9.9** ± 1.4[a]	**12.5** ± 1.1[a]	**4.1** ± 0.2[b]

Composition and repartition in molecular families

Pastures (level 1)



Pastures (level 2)

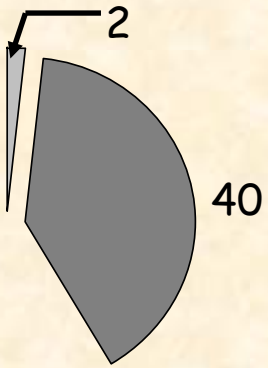


%

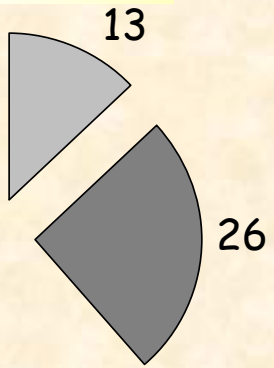
Phenolic acids

- Hydroxybenzoic acids
- Hydroxycinnamic acids

Pastures (level 3)

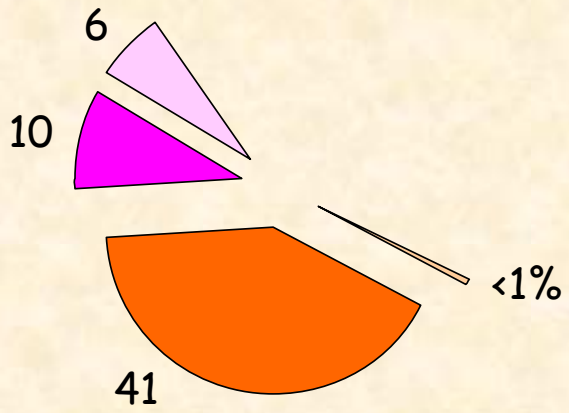


Maize silages

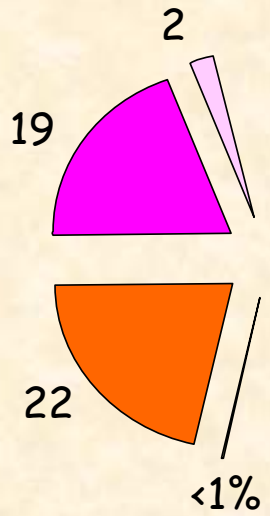


Composition and repartition in molecular families

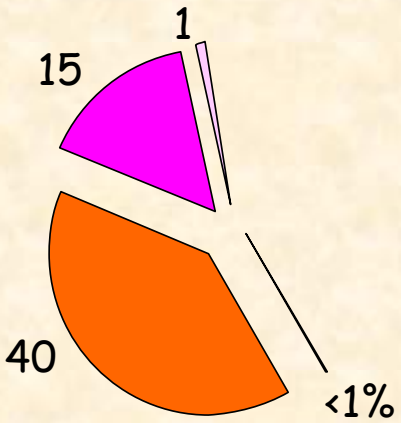
Pastures (level 1)



Pastures (level 2)



Pastures (level 3)

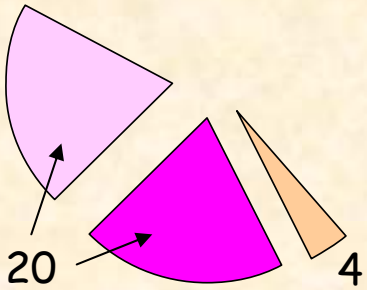


%

Flavonoids

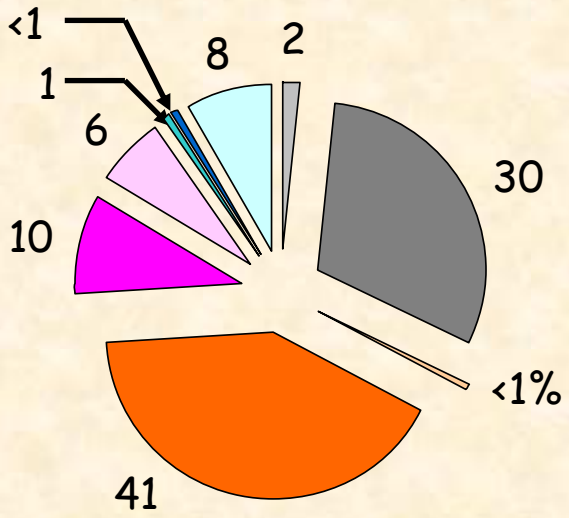
- Flavanols
- Flavanones
- Flavones
- Flavonols

Maize silages

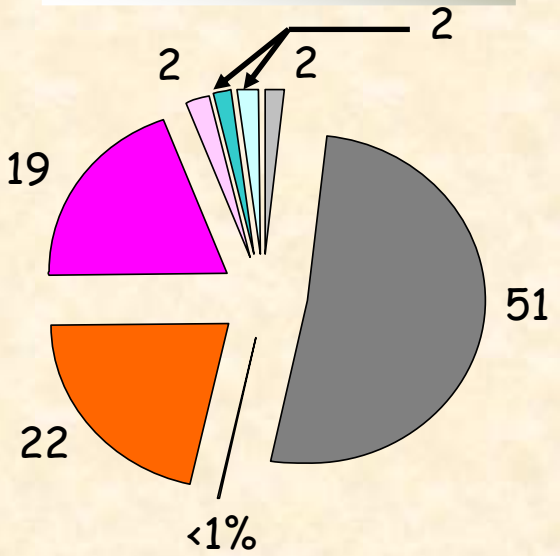


Composition and repartition in molecular families

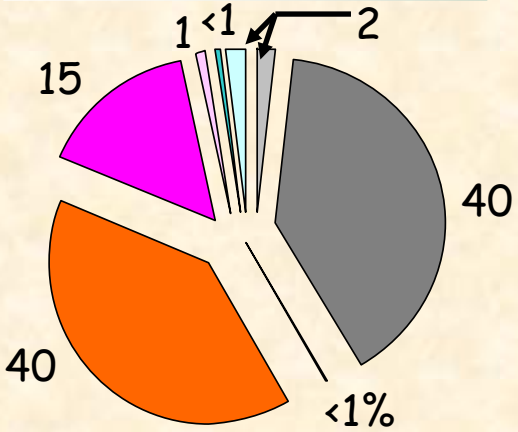
Pastures (level 1)



Pastures (level 2)



Pastures (level 3)

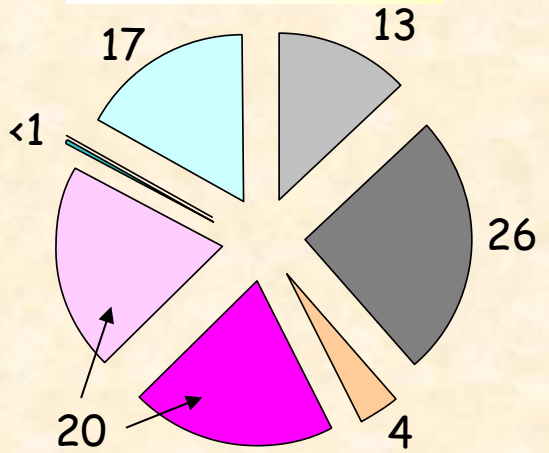


%

Isoflavonoids

- Isoflavones
- Coumestans
- Unclassified compounds

Maize silages



Identification

115 separated peaks

40 Phenolic acids

▲ **11** Hydroxybenzoic acids

Syringic acid

▲ **29** Hydroxycinnamic acids

Néo-, crypto-, & chlorogenic, caffeic, p-coumaric, chicoric, rosmarinic, ferulic acids, verbascoside, 1,5-, 3,5-, 3,4- & 1,3-dicaffeoylquinic acids

56 Flavonoids

▲ **5** Flavanols

Catechin, epicatechin

▲ **32** Flavones

luteolin, luteolin-7-O-glucoside, diosmin, homoorientin, apigenin, schaftoside

11 Isoflavonoids

▲ 10 Isoflavones

Daidzein, genistein, formononetin, biochanin A

▲ 1 Coumestan

Coumestrol

8 Unclassified compounds

▲ **13** Flavanones

Eriodictyol-7-O-glucoside, hesperidin

▲ 6 Flavonols

Rutin, quercetin-3-glucuronide

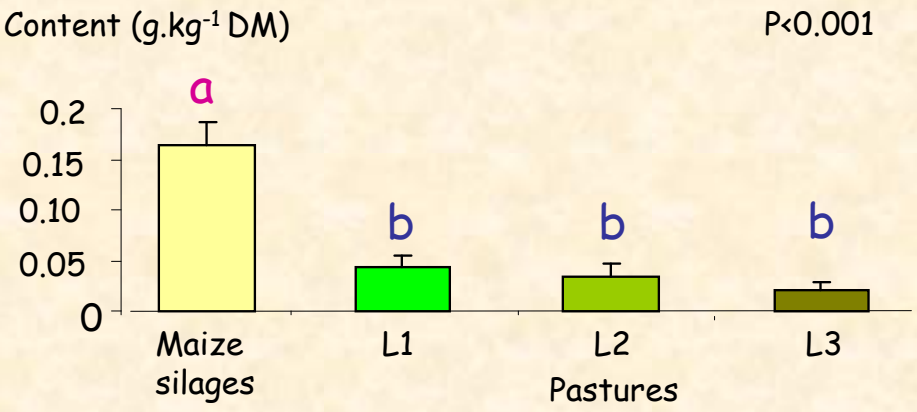
Content differences between forages

115 separated peaks

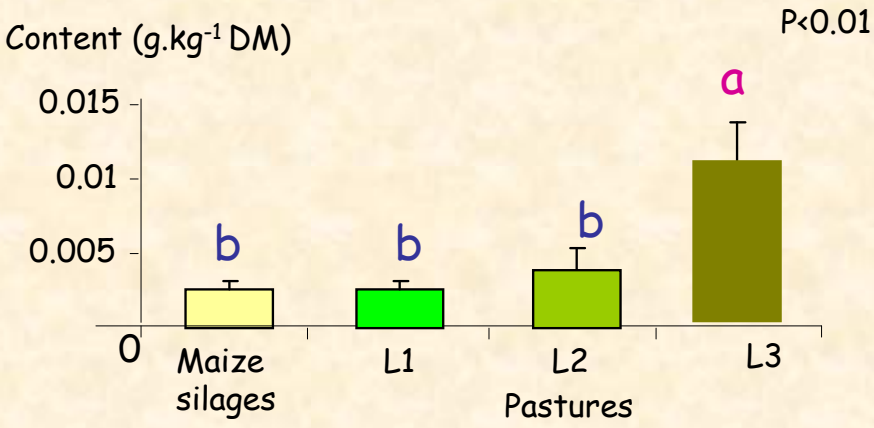
43 in maize silages

- Common peaks

Unidentified compound



Schaftoside



Prospect:

Study amount & composition in the corresponding milks

▲ nature of the forages (maize silage vs pasture): notable differences in the nutritional quality of milks?

Some PC could be tracers of the diet?

▲ Grass (level of floristic diversity/ botanical composition): metabolic links between ingested PC and PC in milks? The implication of some plants ?

Improvement by feeding practices of the nutritional quality of milks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Thanks for your attention