Study on Alkane Patterns of Grassland Species from the Patagonian Steppe

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Study on alkane patterns of grassland species from the Patagonian steppe

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Introduction A reliable estimation of diet composition and forage intake in grazing animals under extensive management in the great rangelands of the world is a relevant aspect for production and conservation programmes . Grassland species from the Patagonian steppe of Argentina-where sheep production is a major enterprise- would differ in their preference by sheep , but studies are scarce and mostly restricted to a few conspicuous species using visual or micro-histological techniques (Pelliza *et al* . , 1997) . Differences in alkane patterns between species or plant parts may be combined with the preceding techniques to aid in the estimation of diet composition (Mayes and Dove , 2000) . The aim of this work was to explore these differences on some main grazed species using Principal Component Analysis (PCA) .

Materials and methods Eight grass species [Poa dusenii (Pd) , Rytidosperma virescens (Rv) , Carex andina (Ca) , Hordeum comosum (Hc) , Festuca pyrogea (Fpi) , Festuca gracillima (Fg) , Festuca pallescens (Fpa) , Stipa crisophyla (Sc)] , one legume [Lathyrus magellanicus (Lm)] and one shrub [Junellia tridens (Jt)] were collected in November 2006 from the southern region of Santa Cruz , Argentina (51°55′ S , 70°25′ W) , and either the entire plant (ep) or different parts [live leaf (ll) , dead leaf (dl) , grazed (g) , ungrazed (u) , spikes (s) , one-year bud (b) , leaf (l) , wood (w) , flowers (f)] (n = 22) were analysed for odd n-alkane (C23 to C35) contents (mg .kg DM-1) (Bakker and Alvarado , 2006) . Alkane contents were transformed into compositional data (% of total) (alkane patterns) and these were further transformed into centred log ratios before PCA (Aitchinson , 1986) . Statistical analysis was done with GNU R and InfoStat/Profesional .

Results and discussion First two principal components (PC1 and PC2) accounted for 66 % of total variance (Figure 1) . Correlation of alkanes with PC1 and PC2 indicates which alkanes produce major variation among species and plant parts (Table 1) . PC1 clearly separated some grazed parts of *Junellia* (leaves and one-year bud) due to higher C_{33} and C_{35} from grass spikes and *Lathyrus* , due to higher C_{27} and C_{25} . PC2 clearly separated *Hordeum* due to lower C_{29} and C_{31} from other grasses (*Rytidosperma* , *F . pyrogea* , *Stipa* and *Poa*) . Leaves and spikes in grasses showed contrasting alkane patterns , which is in line with other reports .

Table 1 *Correlation of alkanes with first two principal components .*

alkanes	PC1	PC2
C_{23}	-0 .38	**-0 .65**
C_{25}	**-0 .47**	**-0 .55**
C_{27}	**-0 .76**	-0 .07
C_{29}	-0 .42	**0 .77**
C_{31}	0 .10	**0 .68**
C_{33}	**0 .97**	0 .03
C_{35}	**0 .78**	-0 .31

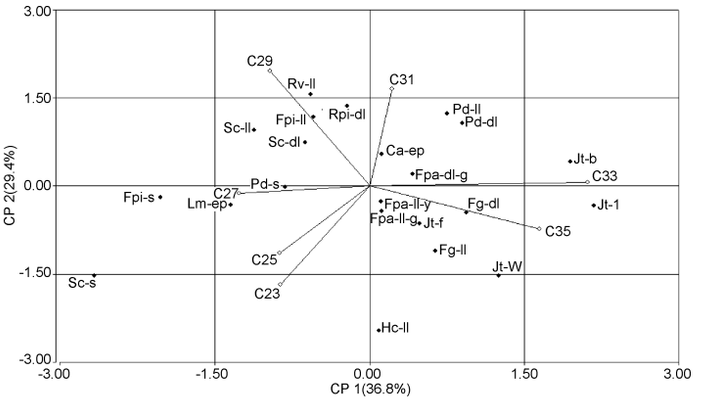

Figure 1 *Covariance biplot of alkane patterns .*

Conclusions Differences in alkane patterns between species and plant parts encourage further studies to evaluate the scope of the alkane technique to aid in the estimation of diet composition and forage intake in the Patagonian steppe .

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