Antioxidant Activity, Vitamin Profiles and Polyphenol Contents of Pasture Grasses and Legumes, Herbs and Wild Plants for Improved Animal Products

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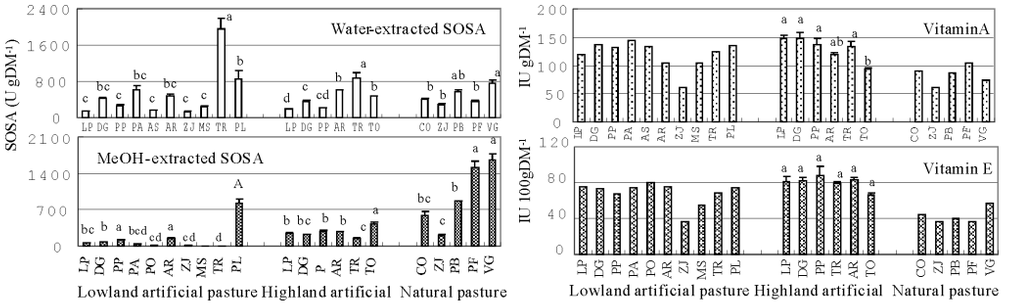
Key words : pastures ,herbs ,antioxidant activity ,vitamin profile ,polyphenol content

Introduction Safety , health and high functionality are the main consumer concerns for animal products . The freshness , desirable fatty acid composition and beneficial vitamin content of meat and milk depend upon the antioxidant content , vitamin profiles , and fatty acid content and composition of animal feeds (Scollan et al . , 2005) . In a previous report (Tamura and Masumizu , 2005) , we showed large differences in antioxidant activities among some pasture species . In this study , we determined and compared antioxidant activities , vitamin profiles and polyphenol contents of the principal herbage grasses and legumes , herbs and wild plants at the vegetative growth stage in northern Japan .

Materials and methods Seven herbage grasses , two herbage legumes and two herbs in artificial swards from lowland (177 m above sea level) and highland (920 m above sea level) pastures , and five wild plants from natural pasture were used (Figure 1) . Superoxide anion radical (O_2^-) scavenging activities (SOSA) of both water-and methanol-soluble extracts ; vitamins A , C and E contents ; and total water-and methanol-soluble polyphenol contents were determined by the spin-trapping method using an electron spin resonance spectrometer (ESR , JES-FA200 JEOL Ltd .) , by the high performance liquid chromatography method using HPLC (LC 10AS systems , Shimazu Co . , Ltd .) , and by the Folin-Denis colorimetric method , respectively .

Results and discussion The SOSA for both water and MeOH extracts differed significantly among species . Water-extracted SOSA was higher in *Trifolium repens* L . , *Plantago lanceolata* L . and *Viola grypoceras* A . , while MeOH-extracted SOSA was higher in *P . lanceolata* , *Taraxacum officinale* Weber and wild plants . Vitamin A and E contents were higher in grasses and lower in *Medicago sativa* L . , *T . officinale* and wild plants , while vitamin C content was higher in herbage legumes and wild plants and lower in herbs . MeOH-extracted total polyphenol contents showed tendencies similar to those observed for the MeOH-extracted SOSA , with a few exceptions . However , the contribution ratios (R^2) in a regression of the total polyphenol content to the SOSA were low .



lowland artificiced pasture Highland artificial Natural pasture .

Figure 1 *MeOH-extracted SOSA and Vitamin A contents of herbage grasses and legumes ,herbs and wilds plants .*
Note :LP :Lolium perenne L . ,DG :Dactylis glomerata L . ,PP :Phleum pratense L . ,PA :Phalaris arundinacea L . ,PO :Poa pratensis L . ,AR :Agropyron repense (L) P . Beauv . ,ZJ :Zoysia japonica Steud . ,MS :Medicago sativa L . ,TR :Trifolium repens L . ,PL :Plantago lanceolata L . ,TO :Taraxacum officinale Weber . ,CO :Carex oxyandra Kudo . ,PB :Potentilla freyniana Bornm . ,PF :Potentilla fragarioides L var .major Maxim . ,VG :Viola grypoceras A .Gray Regarding Tukey's Studentized range test for the MeOH-extracted SOSA for Lowland artificial pasture ,we did the analysis twice ,first all species and secondly only for pastures to detect significant diffeemces among grasses and legumes .Values with different superscripts differed significantly ($P<0.05$) .

Conclusions We found very large differences in SOSA among herbage grasses and legumes , herbs , and wild plants . The results of this experiment will be useful for producing improved animal products , and some of the species , especially *P . lanceolata* , could be used as natural sources of antioxidants against superoxide anion radicals .

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