Leaf Growth Dynamics and Forage Quality in Temperate and Tropical Grasses

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Introduction In grasses , maximum leaf-blade size is achieved at ligulae appearance . However , cell wall (CW) accumulation , as well as the occurrence of changes in CW chemical and structural features continues during leaf aging . Such ontogenic changes in forage quality are currently described by the increase of indigestible NDF (INDF) . At present , many studies are focused on the INDF kinetics during leaf development with modeling purposes . The aim of this study was to evaluate the *in vitro* kinetic of INDF accumulation in individual leaves along their development in three species differing in their potential leaf length and photosynthetic path-way .

Materials and methods Studied species : temperate/ C_3 : perennial ryegrass (*Lolium perenne* , PRG) ; tropical/ C_4 : grama rhodes (*Chloris gayana* , CG) and pangola grass (*Digitaria eriantha* , PG) . The experience was carried out in a glasshouse under adequate nutrient and water availability conditions . Leaf appearance was recorded on marked tillers . Blades were clipped at each leaf appearance interval . The material was immediately frozen with liquid N and further separated into leaf insertion classes . Leaf blade length was measured and leaves of the same insertion level were pooled , lyophilized and ground to 1 mm . INDF was determined in samples incubated in heat sealed F57 filter bags for 24 hours (Daisy , ANKOM Tech . Corp . , Fairport , NY) .

Results and discussion INDF accumulation during leaf development was properly described , in the three species , by lineal functions (Figure 1) . This indicates the period of indigestible cell wall formation would have lasted the whole leaf life spans . This pattern differs with the negative exponential saturation curve used in annual ryegrass by Groot and Neuteboom (1997) to describe the evolution of the indigestible cell wall during leaf development . Slopes did not differ between PRG and PG , both being significantly lower than CG (the half , on average) . Average final leaf lengths were 180±16 , 120±10 and 463±19 for PRG , PG and CG . These results stress the influence that leaf length might have on forage quality associated attributes . Moreover , they do not support the idea that forage quality is strictly associated with plant metabolic pathways . The common pattern of INDF increase with leaf aging observed in PRG and PG might , in part , have been associated with the later being shorter leaved than the former at a same leaf age . The obtained results underline the close link existing between plant morphology , leaf aging and forage quality .

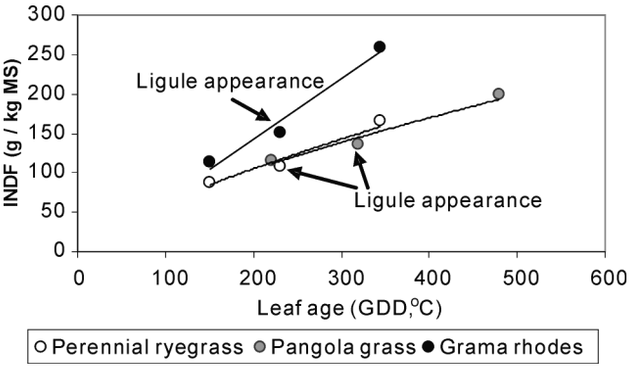

Figure 1 *Relationship between indigestible neutral detergent fiber (INDF)and leaf aging(growing degree days :GDD)in* C_3 *and* C_4 *perennial grasses .*

Reference

Groot J J . and J .H . Neuteboom 1997 . Composition and digestibility during ageing of Italian Ryegrass leaves of consecutive insertion levels . *Sci Food Agric . ,* 75 , 227-236 .