COMPARED PRODUCTIVITY OF LOCAL ECOTYPES AND SELECTED CULTIVARS OF PERENNIAL RYEGRASS (LOLIUM PERENNE) IN HIGH BELGIUM

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ABSTRACT
The objective of the trials was to compare the productivity of local ecotypes of perennial ryegrass (Lolium perenne) issued from old permanent pastures of High Belgium to that of adapted cultivars. During 3 consecutive years 2 local ecotypes were compared, in pure seedling at 2 different levels of nitrogenous manure, to 2 cultivars frequently used in seed mixtures for pastures. Results obtained using a cutting cycle wich simulated grazing did not reveal significant differences in terms of forage production or feeding value. These results explain the weak increase in forage production recorded in pastures renovated by reseeding as compared to non-renovated pastures under the same environmental conditions.

KEYWORDS
Perennial ryegrass, productivity, ecotypes, varieties, feeding value

INTRODUCTION
Prior experiments (Limbourg, 1986) on permanent pasture renovation by reseeding realized in High Belgium (alt.: 300 - 500 m) have shown that renovated plots were not more productive in the long term (+ 4% only on average between years and experimental sites) than control plots grazed and fertilized under the same conditions. Similarly, the feeding value did not always favor the reseeded plots. Similar results have been obtained by Hopkins *et al.,* (1990) on a total of 16 different sites in the United Kingdom under cutting conditions. In all these experiences, the ryegrass 'Vigor' (or 'Melle') alone had been used in reseeding and was compared to the complex flora of old permanent pastures in which ryegrass contributed to no more than 30%.

The objective of the test presented hereafter was to compare, in pure seedings, the production potential of local ecotypes (*Lolium perenne*) commonly present in the flora of old permanent pastures of the region to that of adapted cultivars and to put forward possible differences concerning their feeding value.

MATERIAL AND METHODS
Two local ecotypes of perennial ryegrass, 'Deglin'and 'Lemaire', have been collected in old permanent pastures of the region of Libramont (alt.: 450 m) in the Ardenne region (Belgium) and cultivated for the seed production. These 2 ecotypes have been sown in 1988 at a density of 40 kg ha^{-1} and at the same time cultivars 'Talbot' (similar precocity as the ecotypes) and Vigor (more late) were sown in contiguous plots in 2 different sites in the Ardenne region. The two tests differed essentially by the nitrogenous fertilizer level: 100 u. N ha^{-1} (5 x 20 u.) on the one hand and 200 u. N ha^{-1} (5 x 40 u.) on the other hand. The phospho-potassic fertilization was identical and not limiting to compensate exports due to the cuttings: 150 u. P_2O_5 ha^{-1} and 350 u. K_2O ha^{-1}.

The experimental design included in each site 2 different exploitation modes:

1. simultaneous cuttings at a grazing rhythm (G) on all the plots every time that the height of the grass reached 15 - 20 cm (5 cuts /year);
2. "mixed" (M) mowing - grazing cutting rhythm, the first cut being undertaken at heading stage at differing dates according to the varieties' precocity, following cuts undertaken at the grazing rhythm (4 cuts/year).

Plots (1.35 m x 6 m) were established on each site in 2 x 4 repetitions in a lattice square. In 1991, after 2 years of trial, all plots have been cut at the grazing rhythm. Samples of the grass have been collected on each cut to determine their feeding value by NIR BISTON and DARDENNE (1985), as well as their mineral content by atomic absorption.

RESULTS AND DISCUSSION
Table 1 presents the average dry matter yields recorded under the grazing rhythm (G) and in the "mixed" regime (M) in the years 1989 and 1990, as well as those obtained under the grazing rhythm in the 2 cases in 1991. Average heading dates were: 28/5 for Deglin, Lemaire and Talbot, 20/6 for Vigor.

In the grazing cutting regime, production of the 4 varieties was not significantly different ($P<0.05$), despite a slight superiority (+ 4.7% on the average) for Talbot, regardless of the nitrogenous fertilizer level applied. The 2 local ecotypes appeared as productive as Vigor and there were no practical differences between them.

When the first cutting is undertaken at heading stage for a crop such as hay or silage (M), annual forage production of the 2 ecotypes Deglin and Lemaire were between those of Talbot and Vigor. However, the productivity of Lemaire did not differ significantly from that of Talbot; that of Deglin was not very different than that of Vigor. At identical precocity, Talbot presents a forage output superior of 11.9% on average to that of Deglin, but only 3.2% to that of Lemaire. The classification of varieties was not modified by the nitrogenous manure level.

A summary of chemical analysis results of the grass is shown in table 2. At the grazing stage (G) during 3 years and at the early heading stage in plots M in the years 1989 and 1990.

Generally, the ecotypes Deglin and Lemaire have a slightly better feeding value than that of the cultivars Talbot and Vigor, mainly at the heading stage. They produced a systematically better K and especially P content than that of the 2 cultivars, but were lower in Na content (mainly Lemaire), in Mg and in Ca content (mainly Deglin). Vigor stands out by its high contents of Na, Mg, Ca and Mn, but low content of P. It appears that these minerals allow the differentiation of varieties, more so than the composition of organic matter. The increase of nitrogenous manure has allowed, for the 4 varieties, a forage crop of better quality from an organic composition point of view as well as for mineral content.

CONCLUSIONS
In conclusion of these 2 trials, it appears that spectacular increases of dry matter yield should not be expected in reseeding of permanent grazed pasture after the replacement of indigenous ryegrass by selected varieties. A similar conclusion may be drawn concerning

the feeding value of the grass. Good management techniques, possibly accompanied by an oversowing to fill the empty patches, will probably suffice most often to improve pasture flora.

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Table 1
Average dry matter yields kg DM ha-1 yr-1

	G (89-90)		M (89-90)		G (91)		M (91)	
	100N	200N	100N	200N	100N	200N	100N	200N
Deglin	7003	9795	8849 ab	11985 a	6589	8697	6486	8948
Lemaire	6987	9782	9542 b	13048 b	6548	8207	6398	9048
Talbot	7450	10259	9561 b	13751 b	6892	8585	6836	9592
Vigor	6690	10127	8161 a	11622 a	6816	8279	6694	9067
p=0.09	p=0.48	p=0.03	p=0.01	p=0.48	p=0.69	p=0.17	p=0.26	
RSE	332	494	534	601	347	658	258	442

Same letters indicates significantly differing values in a same column (P<0,05) (Newman-Keuls test)

Table 2
Digestibility and chemical composition of the grass

	%DM	DCP	CF	OMd	K	P	Na	Mg	Ca	Cu	Zn	Mn
		g/kg DM		%	g/kg DM					mg/kg DM		
a/ mean of the cuts P (89-91)												
Deglin	24.0	109	219	84.3	28.2	4.14	.70	2.00	5.52	8.8	29.7	102.3
Lemaire	24.1	110	222	83.9	28.2	4.16	.54	2.11	5.72	8.6	30.5	92.4
Talbot	24.1	106	221	83.7	26.5	3.98	.79	2.12	6.14	8.8	30.7	105.0
Vigor	24.1	111	224	83.4	27.2	3.87	.89	2.23	6.42	9.3	29.1	110.0
b/ early heading M (89-90)												
Deglin	24.2	66	233	79.5	26.3	3.18	.52	1.33	4.45	7.5	22.1	62.7
Lemaire	23.9	70	237	79.0	26.7	3.24	.44	1.43	4.61	7.1	22.7	56.1
Talbot	23.4	61	254	77.1	25.3	3.11	.56	1.36	4.74	7.5	22.7	59.5
Vigor	25.8	44	262	76.4	23.1	2.38	.60	1.39	5.00	6.8	18.8	80.3

DCP: digestible crude protein (Kjeldhal)
CF: crude fiber (Weende)
dOM: enzymatic digestibility of the organic matter, %.