Cattle and sheep mixed grazing: 2. competition

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Introduction The outcome of mixed grazing depends on the degrees of complementarity and competition between animal species. Complementarity increases the utilisation of herbage resource but competition may be desirable when one grazing species has a higher priority ranking in the farming system. A species wins in the competition by harvesting a higher proportion of the available herbage than the other (Nicol, 1997). De Wit (1960) used the replacement series based on degrees of substitution of species, for the quantification of the outcome of mixtures experiments. The use of species equivalence is required in order to apply this approach to the analysis of the outcome of a mixed grazing experiment. This paper aims to discuss the competition between heifers and ewes in a dairy system, where heifers have a higher priority ranking. Data on species equivalence, reported in Paper 1, were used for this purpose.

Materials and methods The species equivalence based on average herbage dry matter intake (DMI) estimated in Paper 1 corresponded with the estimate of DMI requirements based on live weight (LW), using $LW^{0.9}$. Analysis using the replacement series approach was carried out *a posteriori*. Species proportions (SP) were calculated as SP= $\sum LW^{0.9}$ of the species/$\sum LW^{0.9}$ of both species (average LW 361 and 75.7 kg for heifers and ewes, respectively). DMI/ha of each species (DMI_a) was calculated as $II_a \times n_a/AA \times 10000$, where II_a is the DMI/animal of species a, n_a is the number of animals of species a and AA is the daily area allotted (m^2). The proportions DMI/ha of each species in total DMI/ha were calculated thereafter and linear regression equations of those proportions on the proportions in total $LW^{0.9}$ were developed.

Results Total DMI increased with the proportion of ewes, i.e., the inclusion of ewes increased the efficiency of herbage utilisation (Figure 1a). There was a narrow relationship (R^2=0.97, p<0.0003) between proportions of DMI and proportions of $LW^{0.9}$, with small deviations from the 1:1 relationship (Figure 1b). Both species appeared to be more competitive to some extent when in high proportions of total $LW^{0.9}$. Therefore, heifers were slightly more competitive than ewes if their proportion in total LW^{09} was >0.47 (Figure 1b).

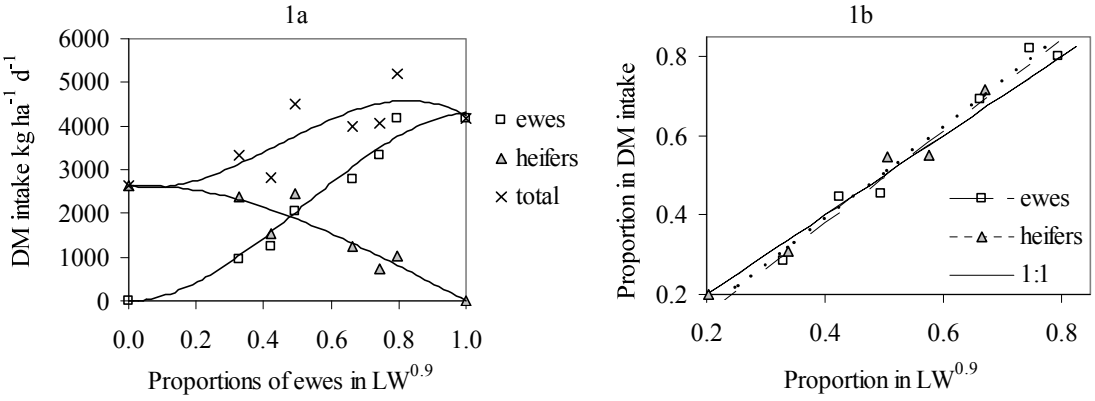

Figure 1 Herbage DMI of heifers and ewes related to proportions of ewes in total $LW^{0.9}$ (1a) and DMI of each species as proportion of total DMI related to proportions of the species in total $LW^{0.9}$ (1b)

Conclusions Ewe inclusion increased the efficiency of utilisation of herbage. One might recommend ewe inclusion at <0.53 of total $LW^{0.9}$ because that gave a slight competitive advantages to heifers (the species with higher priority ranking in the farming system).

References

de Wit, C. T. W. (1960). On competition. Verslag Landbouwkundig Onderzoek No. 66, Pudoc, Wageningen, The Netherlands, 1-82.

Nicol, A. M. (1997). The application of mixed grazing. In: Buchanan-Smith, J. G., L. D. Bailey & P. Mc Caughey (Eds.) *Proceedings of the XVIII International Grassland Congress*, Winnipeg and Saskatoon, Canada, 525-534.