## Cattle and sheep mixed grazing: 1. species equivalence

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**Introduction** The effects of mixed grazing of cattle and sheep depend on stocking rate (SR) and species ratio (Nicol, 1997). Calculations of SR and species ratio require the use of species equivalence. Equivalents are often estimated in terms of intake requirements related to live weight (LW), while maintenance energy requirements are calculated on the basis of $LW^{0.75}$. Freer (1981) stated that $LW^{0..9}$ would be more appropriate for comparisons of intake requirements for maintenance of sheep and cattle. Nonetheless, Nolan & Connolly (1977) stated that the equivalent is system-specific and depends on the species being considered. The objective of this experiment was to estimate species equivalence for a dairy system based on grazing in temperate Mexico.

**Materials and methods** The experiment was carried out at Chapingo, Mexico (19°29' N, 98°54' W,2240 m a.s.l.), between 15 March and 25 May 2000. Holstein heifers (initial LW 336±7 kg) and pregnant Suffolk ewes (initial LW 75.8±0.8 kg) were used. There we 8 treatments, 3 heifers were used per mixture treatment and numbers of ewes varied to achieve the proportions of species shown in Table 1. Nine paddocks of *Medicago sativa* and *Dactylis glomerata* of 0.46 ha were strip-grazed for 7 days each. Three blocks of 3 paddocks were formed and treatments were randomly allotted to paddocks; only one paddock was grazed per week, the paddocks of the first and second week of each block were grazed by three treatments (each on separate areas), while the third-week paddock was grazed by the remaining two treatments. Fresh areas of pasture were allotted when already grazed areas reached 10 cm height (falling disc); no back fencing was used. The areas effectively grazed after 7 days were measured. Herbage dry matter (DM) intake was measured using chromium oxide as external marker and *in situ* digestibility of hand plucked herbage samples.

**Results** Excluding the treatment of grazing by ewes only, a linear equation was calculated of area allotted ($m^2$/d) on number of ewes: $y = 97.9 + 4.29\ x$, $R^2 = 0.94$, ($P < 0.05$) (Table 1); the intercept and the regression coefficient represent the area allotted to 3 heifers and the additional area allotted per ewe, respectively. The equivalent based on area allotted resulted in 7.6 ewes per heifer [(97.9/3)/4.29]. The equivalent based on average herbage DM intake in Table 1 (8.76 and 2.31 kg DM/animal/d) for heifers and ewes, respectively) resulted in 3.8 ewes per heifer (8.76/2.31), corresponding with the estimate of intake requirements using $LW^{0..9}$ ($336^{0..9}/75.8^{0..9}$), as recommended by Freer (1981). This difference between estimates of equivalents, expresses the higher efficiency of herbage utilisation under mixed grazing than under single species grazing by heifers, which was due to grazing by sheep below 10 cm height (data not shown here).

**Table 1** Area allotted and herbage intake of heifers and ewes under single species grazing and mixed grazing with different ewes to heifer's ratios

| Nr. of heifers | Nr. of ewes | Area allotted ($m^2$/d) | Intake (kg DM/heifer/d) | Intake (kg DM/ewe/d) |
|---|---|---|---|---|
| 3 | 0 | 93.4 | 8.17 (0.49) | |
| 3 | 6 | 131.6 | 10.50 (0.33) | 2.08 (0.15) |
| 3 | 9 | 148.2 | 7.68 (0.49) | 2.07 (0.15) |
| 3 | 12 | 116.0 | 9.54 (0.33) | 1.98 (0.15) |
| 3 | 24 | 218.6 | 8.98 (0.33) | 2.52 (0.15) |
| 3 | 36 | 269.5 | 6.49 (0.49) | 2.49 (0.15) |
| 3 | 48 | 287.6 | 9.93 (0.33) | 2.49 (0.15) |
| 0 | 15 | 91.5 | | 2.54 (0.15) |

**Conclusions** The use of an equivalent based on DM intake (3.8 ewes/heifer), which concurs with intake requirements based on $LW^{0..9}$, would neglect benefits of more efficient pasture utilisation under mixed grazing; the use of the higher equivalent based on area allotted (7.6 ewes/heifer) should lead to better performance of the system.

**References**

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