

Stand persistence of tall fescue pasture cultivars free of or infested with *Acremonium coenophialum*

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The endophytic fungus *A. coenophialum* in tall fescue (*Festuca arundinacea*) is associated with substantial economic losses (almost one billion dollars) on grazing beef cattle in the eastern USA (Stuedemann and Hoveland, 1988, J Prod Agric, 1, 39-44; Fribourg *et al*, 1991, Fourrages, 126, 209-223). Although use of endophyte free (E⁻) cultivars leads to improved livestock performance, persistence and stress tolerance of E⁻ tall fescue under grazing are uncertain even with good management (Fribourg *et al*, 1988, J Prod Agric, 1, 122-127; Fribourg *et al*, 1991, TN Farm & Home Sci, 160, 30-37). This study was to compare the persistence of E⁻ and E⁺ tall fescue cultivars under controlled grazing conditions.

Three treatments were established near Knoxville (35°49'N, 83°59'W) in a 1989-1994 study to compare 80% E⁺ 'KY-31' tall fescue pastures with E⁻ KY-31 pastures and with a treatment consisting of alternating groups of four 20-cm drill rows of E⁺ and E⁻ seed (E^{+/E}). The E⁻ cultivars 'Johnstone', 'AU-Triumph', and 'Martin' were evaluated also. Treatments were replicated twice in a randomized complete block design, and experimental units measured 1.2 ha. Experimental steers grazed from age 8 mo each fall until age 18 mo the next year; grazing was done each year for 4 fall-winter

seasons, early November to mid-January, and for 4 spring-summer seasons, mid-March to early September. Additional grazing animals were used when forage growth was rapid, to keep forage height between 10 and 15 cm, resulting in 800 to 1500 kg/ha of available forage throughout. Levels of endophyte infestation were monitored yearly and remained constant. Stand density, ground cover and species composition were estimated for each pasture by two observers at 21-d intervals (Mitchell *et al*, 1986, Agric Systems, 20, 269-279). The density of tall fescue plants was measured also each spring at 96 random sites in each pasture with inclined point quadrats (10 pins 5-cm apart/quadrat) both parallel and perpendicular to the drill seeding rows.

Excellent uniform stands of all treatments were obtained and maintained for 3 yr. Following a June-July drought in 1993, stands of E⁻ cultivars declined rapidly in the succeeding fall and winter. By spring 1994, stands of the E⁻ cultivars were insufficient to continue grazing, but stands of E⁺ and E^{+/E} were still excellent. Although the inclined point quadrat data indicate a decrease from 1993 to 1994 in E⁺ and E^{+/E} stands, sod density was acceptable in these pastures and equal for E⁺ and E⁻ in the E^{+/E} treatment; sod density was not adequate for the E⁻ cultivars.

| Year | E ⁺ KY-31 | E ^{+/E} KY-31 | E ⁻ KY-31 | Johnstone | Martin | Triumph |
|--------------------------------------------------|----------------------|------------------------|----------------------|-----------|--------|---------|
| <i>Hits on tall fescue at ground level (%) :</i> | | | | | | |
| 1991-93 | 83 | 86 | 87 | 81 | 78 | 69 |
| 1994 | 49 | 48 | 20 | 15 | 35 | 20 |
| <i>Ground cover by tall fescue (%) :</i> | | | | | | |
| 1991-93 | 98 | 98 | 97 | 88 | 92 | 94 |
| 1994 | 98 | 96 | 25 | 15 | 25 | 40 |