EFFECT OF ENDOPHYTE-INFECTED TALL FESCUE HAY ON DAIRY HEIFERS UNDER EUROPEAN INTENSIVE MANAGEMENT

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ABSTRACT
Two fields were established at Lusignan (France) with the same variety of tall fescue but differing in the rate of *Acremonium coenophialum* seed infestation : 0 % = E- ; 100 % = E+. Dairy heifers were fed *ad libitum* with E- or E+ hay and were given in addition 1.7 kg DM of concentrates. No effect was noticed on the intake (5.65 vs 5.63 kg DM) as well as on ADG (874 vs 838 g/d) regarding E- vs E+ hay resp. However, prolactin concentration was significantly halved when heifers were fed with the E+ hay. More temperate climatic conditions during the growing period of tall fescue and the feeding period as well as intensive management could have decreased the potential negative effect of endophyte on animal performances although changes in hormonal profiles in blood were noted.

KEYWORDS
endophyte, tall fescue, *Acremonium coenophialum*, heifer, growth, intake, prolactin

INTRODUCTION
Stock-breeders and seed firms in Europa are more and more questioned on the potential effect, either harmful or beneficial, of the endophytic fungus *Acremonium coenophialum*, naturally occuring in tall fescue. The effects of this endophytic fungus on both plant growth and beef cattle performances in USA are now well documented (recent reviews of Joost, 1995 and Paterson *et al.*, 1995). In France, a large scale evaluation in commercial seeds of tall fescue in 1986 showed that half of the samples were infested up to a rate of 58 %. Some toxicosis have been then described on cattle grazing old stands of tall fescue (Raynal, 1991).

Therefore, our objectives were to provide data on the feeding value of infested vs non-infested hay and to evaluate their effects on performances of cattle fed under representative conditions of intensification in Western Europa. We demonstrated previously that infected hay had a strong negative effect on palatability and intake but no effect on digestibility measured either by in vivo or in vitro methods (Emile *et al.*, 1996). A survey of intake, growth rate, blood prolactin concentration is reported hereafter from dairy heifers fed with the same experimental hays.

MATERIALS AND METHODS
Two fields (2 ha each) were established in the INRA Plant Breeding Station at Lusignan (France, 0.15° E, 45.26° N) in Autumn 94 with the same mid-late variety of tall fescue (Cv Clarine) but differing in the rate of endophyte seed infestation : 0 % = E- ; 100 % = E+. A late hay cutting was done in June 1995 in order to maximise the potential toxic effect of the endophyte. E+ and E- hays were then assessed by animals. Dairy 'Holstein' heifers were fed *ad libitum* in July and August 1995 with E- or E+ hay in a crossed trial of 5 weeks and 12 animals per batch. As heifers were intended to be used as a high performing dairy cattle next year, they were given 1.7 kg DM a day of concentrates (77 % barley, 18 % soya cake and 5 % of a mineral and vitamin mix). Forage intake (4 days a week) as well as average daily gain (ADG) were recorded. On day d1, d14 and d28 of each of the 2 periods (p1 and p2), single blood samples were collected by tail venipuncture. After centrifugation (3000 t/mn; 4°C) the plasma was frozen. Prolactin concentration in plasma was determined by the procedure of Lacroix *et al.* (1977). Individual data of growth rate and prolactin concentration were tested by analysis of variance (GLM procedure of SAS). Hay effect on prolactin concentration on d14 and d28 were tested taking d1 concentration at each period as covariable.

RESULTS
Both E- and E+ hays were similar regarding chemical composition (88.9 % dry matter, 92.1 % organic matter, 10.9 % crude protein, 65.7 neutral detergent fiber and 31.2 acid detergent lignin).

During the 10 weeks of the trial, intake of E- and E+ hay was very close, with 20 % of increase from the beginning to the end of experiment. The mean value of daily intake was respectively 5.65 and 5.63 kg DM for E- and E+.

The average daily gain in the second period (707 g) was lower than in the first period (1006 g) but no significant differences occurred between E- and E+ hay which allowed respectively a 874 and 838 g/d ADG.

However, prolactin concentration was halved when heifers were fed with E+ hay while it remained constant with E- hay. Concentration on d1 was lower in period p2 than in period p1, probably because of some feed-back effects of period p1 on period 2 and of the transition period.

DISCUSSION
According to estimations of Fribourg *et al.* (1991), ADG should have been reduced by a third when heifers were fed with the E+ hay. However, our results indicated that the endophyte did not affect growth rate nor intake of high yielding heifers. The presence of the fungus was nevertheless not without consequences. As shown in many studies (Bolling et al., 1989; Aldrich et al., 1993) a rapid and strong drop of prolactin concentration occured when heifers were fed with the E+ hay.

The variation in prolactin concentration and the strong difference of palatability found previously between the two kinds of hay (Emile *et al.* 1996) allow us to assume that the E+ hay was potentially highly toxic but was not able to provoke animal performance decrease because of our experimental conditions. Environmental conditions (average temperature of 27.9 °C is lower than in the Middle West of the USA) and feeding management (concentrates given to heifers) could have decreased the potential negative effect of the endophyte on animals and could explain that the results are in discordance with North American studies. Also, two 5 week feeding periods might have been too short to point out obvious toxic effects.

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Table 1
Effect of infested (E+) vs non infested (E-) hay of tall fescue on performances of heifers.

	E- hay	E+ hay	hay effect
concentrate intake (kg DM/day)	1.75	1.75	
hay intake (kg DM/day)	5.65	5.63	
growth (ADG g/day)	874	838	ns
prolactin d1 (ng/ml)	44.5	37.8	ns
prolactin d14 (ng/ml)	42.7	20.2	$p<0.001$
prolactin d28 (ng/ml)	30.5	15.8	$p<0.001$