

Accumulation of zearalenone in herbage of winter pasture situated in West Poland

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Introduction The importance of winter pastures in beef production in Europe has been growing steadily. In Poland, especially in its western part, there are already farms which utilise pasture swards during late autumn and winter. The major problem, however, is the quality of forage ingested by animals as it tends to deteriorate with the passage of the vegetation season with danger of accumulation of various mycotoxins (Laser *et al.*, 2003) of which the most important is zearalenone (ZEA).

Materials and methods During 2001-2003, an experiment was set up in Brody (52° 26' N, 16° 18' E) with a low-input pasture system in a paddock with a *Lolium-Cynodactylon* community dominated by *Poa pratensis*. There was a randomised Latin square design with three replicates (plot 20 m²). The factors were (a) time of pre-utilisation in summer (US) – last use at the beginning of June (Jun.), beginning of July (Jul.), beginning of August (Aug.) and (b) date of harvest in winter (HW) – at the beginning of November (Nov.), middle of December (Dec.), and end of January (Jan.). In each of the two years, the pasture was fertilised with 50 kg/ha N in the second half of August, in order to simulate the return of nutrients left with the faeces of grazing animals. To estimate the yield of winter pasture plots and collect samples for chemical analyses an area of 10 m² of the sward was cut. Herbage from each plot (27 samples per year) was analysed for concentration of ZEA using ZaeralaTestTM column (Vicom USA) and HPLC method.

Results Accumulation of ZEA in herbage of winter pasture differed depending on US, HW and investigation year, being significantly higher in 2002/03. Higher concentrations of ZEA (19.4 ng/g DM) were found in the forage harvested in Jan. when compared to samples collected in Nov. and Dec. (6.6 and 4.5 ng/g DM, respectively). The highest concentration of ZEA for a single sample for each month are given in Table 1. According to literature data from Germany, dietary concentrations of ZEA in fodder higher than 500 ng/g DM may have adverse effects on heifers, dairy and suckler cows. The quantities of ZEA in the DM of winter pasture are shown in Figure 1. The highest number of samples in which ZEA exceeded the level of 3 ng/g DM (detection limit) occurred when the sward was harvested in Jan. (77.8%), indicating that the shorter the period of unfavourable weather conditions the lower the percentage of ZEA positive samples – 72.3% in Nov. and 61.2% in Dec.

Table 1 Highest concentration of ZEA in herbage of winter pasture (ng/g DM)

HW	US	2001/02	2002/03
Nov.	Jun.	14.20	9.52
	Jul.	8.84	23.58
	Aug.	12.50	7.92
Dec.	Jun.	5.87	10.93
	Jul.	4.88	3.05
	Aug.	6.48	17.77
Jan.	Jun.	6.44	36.42
	Jul.	7.03	98.93
	Aug.	47.89	79.10

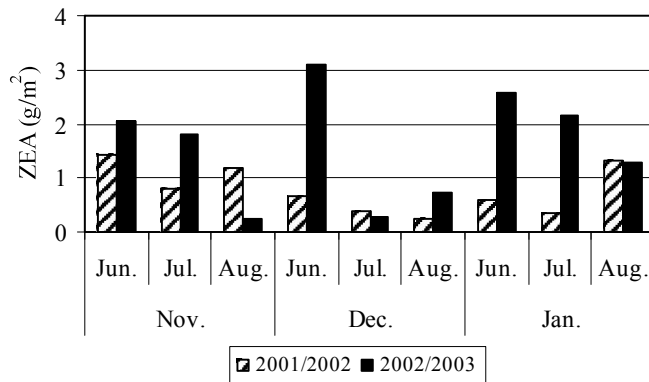


Figure 1 Quantity of ZEA in DM yield of winter pasture

Conclusions The results confirm that

ZEA may decrease the quality of forage from winter pasture in West Poland. With increasing duration of sward regrowth, the accumulation of ZEA in herbage increased. The highest concentration of ZEA (on average, 19.4 ng/g DM) was recorded in forage harvested in end of January. Concentrations were though lower than those that have been reported to have adverse effects on cattle.

References

Laser, H., W. Opitz von Boberfeld, K. Wöhler & D. Wolf (2003). Effect of the botanical composition and weather conditions on mycotoxins in winter forage from grassland. *Mycotoxin Research*, 19, 87-90.