ZEARALENONE IN PASTURE AND ITS EFFECTS ON REPRODUCTION IN EWES

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ABSTRACT

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Zearalenone is an oestrogenic mycotoxin which has the potential to cause reproductive disorders in sheep. Zearalenone-producing Fusarium species are present in New Zealand pasture and it is likely that the amount of zearalenone present during the mating period may be sufficient to cause reproductive dysfunction in the grazing sheep.
This study consisted of three trials which aimed to measure zearalenone levels in the pasture and sheep, and determine the subsequent effects on reproductive performance. The first trial investigated the levels of zearalenone during April in various components of the ryegrass plant at various pasture sites, which included urine-patch, dung-patch and inter-excreta sites. Zearalenone taken up by the ryegrass plant was also determined. The second trial comprised of 6 groups of ewes (n=10), and compared levels of zearalenone and related metabolites in the blood and urine of ewes grazed on pasture or chicory and either orally (5 mg/ewe)or intravenously dosed (2 or 0.5 mg/ewe) daily with zearalenone. The subsequent effects on ovulation rate, conception rate, and number of lambs carried was also determined. The third trial comprised of 4 groups (n=l 10) of ewes, of which two groups were grazed on grass-dominant pasture and the remaining 2 groups were grazed on chicory for two weeks prior to mating at which time one of the groups on each grazing treatment was interchanged and the ram introduced. The levels of free and conjugated zearalenone in the blood and urine were determined and the subsequent effects on ovulation rate, conception rate and the number of lambs carried were measured.

In the first trial it was shown that zearalenone concentration within sites was highly variable at that time of the year, however, urine-patch and dung patch sites yielded significantly higher quantities of zearalenone. Zearalenone appeared to be readily taken up by the ryegrass plant through the roots and translocated into the young growing tissue of the plant. The distribution of zearalenone in the pasture and the plant are discussed with regards to zearalenone intake by the animal.
The zearalenone dosing trial showed that significant levels of zearalenone, α-and β-zearalenol, zeranol and taleranol were present in the blood and urine of dosed ewes and that levels of all compounds analysed were higher in ewes grazed on pasture. Ewes grazing pasture had a significantly lower ($P<0.05$) ovulation rate than ewes grazed on chicory.
The third trial showed that chicory was effective in reducing the levels of free zearalenone present in the ewe around the time of mating with levels in ewes grazed on chicory being significantly lower ($P<0.05$) in both the urine and blood, than in ewes grazed on grass pasture. There were no significant differences in reproductive performance. Zearalenone levels in the pasture were generally lower in 1995 than in previous years and might have reduced possible differences in reproductive performance between ewes on the different feed types.
The implications of higher zearalenone concentrations in the pasture are discussed with regards to reproductive performance and the use of chicory as a feed prior to mating.

Further research is required to identify and clarify links with zearalenone and metabolites produced in pasture and reproductive dysfunction in ewes.

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LIST OF ABBREVIATIONS AND DEFINITIONS

kg	**Kilograms**
g	**Grams**
mg	**Milligrams**
µg	**Micrograms**
ng	**Nanograms**
ppm	**Parts Per Million**
ml	**Millilitres**
mmol	**Millimols**
Z/Cr	**Zearalenone:Creatinine ratio**
CIDR	**Controlled Internal Drug Release**
°C	**Degrees Celsius**
GC-MS	**Gas chromatography-Mass spectroscopy**
HPLC	**High performance liquid chromatography**
IgG	**Immunoglobulin**
LH	**Luteinizing Hormone**
FSH	**Follicle Stimulating Hormone**
N	**Nitrogen**
Fusarium	**Used when describing a particular species**
Fusarium	**Used when description is non-specific**
fusaria	**Used when referred to collectively**