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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=110) 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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TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
LIST OF FIGURES	vii
LIST OF TABLES	x
LIST OF PLATES.....	xi
LIST OF ABBREVIATIONS	xii
CHAPTER I. Introduction	1
CHAPTER II. Review of literature	3
1. The mycotoxin zearalenone.....	3
2. Zearalenone metabolism and chemistry	4
3. Effects of zearalenone in laboratory animals.....	6
4. Effects of zearalenone in pigs	6
5. Effects of zearalenone in poultry.....	8
6. Effects of zearalenone in cattle.....	9
7. Effects of zearalenone in sheep	9
8. Production of zearalenone.....	11
9. Purpose and scope of the study.....	13
CHAPTER III. The distribution of zearalenone in ryegrass pasture and uptake by the ryegrass plant.....	14
1. Introduction.....	14
2. Methods and Materials	15
2.1. Distribution of zearalenone in ryegrass pasture.....	15
2.1.1. Zearalenone determination	16
2.2. Uptake of zearalenone by the ryegrass plant.....	16
2.3. Statistical analysis	19
3. Results.....	19
3.1. Zearalenone concentration in pasture sites	19
3.2. Soil samples.....	21

3.3. Zearalenone yield (Total zearalenone in the plant tissue).....	21
3.4. Determination of zearalenone concentration and yield i n components of ryegrass tillers from inter-excreta, urine patch and dung patch sites	23
3.4.1.Zearalenone concentration.....	23
3.4.2. Zearalenone yield	25
3.5. Zearalenone uptake.....	27
3.5.1. Zearalenone yield	27
3.5.2. Zearalenone concentration in nutrient solutions	28
4.Discussion	28
4.1. Zearalenone distribution in pasture	28
4.2. Assessment of the method of estimation of zearalenone distribution	30
4.3. Zearalenone uptake by the ryegrass plant.....	31
4.4. Assessment of the method	31
4.5. Conclusions.....	32
CHAPTER IV. Zearalenone and related compounds in the blood and urine of ewes intravenously and orally dosed with zearalenone and the effects on reproductive performance.....	33
1. Introduction.....	33
2. Methods and Materials	34
2.1. Animals and treatments	34
2.2. Determination of zearalenone and its metabolites in blood and urine	35
2.3. Statistical analysis	36
3. Results.....	36
3.1. Liveweight	36
3.2. Ovulation rate.....	37
3.3. Conception rate	37
3.4. Zearalenone in the forages	38
3.5.Zearalenone and its metabolites in blood	38
3.6. Zearalenone and its metabolites in urine.....	42
4. Discussion	45
4.1. Animal measurements	45
4.2 Zearalenone in the blood.....	46
4.3. Zearalenone in the urine.....	46

4.4. Metabolism of zearalenone.....	48
4.5. Zearalenone-related metabolites in the urine.....	49
4.6. Conclusions.....	49
CHAPTER V. Zearalenone in ewes grazed either on pasture or chicory and subsequent effects on reproductive performance.....	50
1. Introduction.....	50
2. Methods and Materials	51
2.1. Animals and treatments	51
2.2. Sampling	52
2.3. Zearalenone determination in herbage, blood and urine.....	52
2.4. Statistical analysis	52
3. Results.....	56
3.1. Weight change and reproductive performance	56
3.2. Zearalenone in the herbage.....	57
3.3. Zearalenone in the blood.....	57
3.4. Zearalenone in the urine	59
4. Discussion	60
4.1. Animal measurements	60
4.2. Zearalenone in the herbage.....	60
4.3. Zearalenone in the blood.....	61
4.4. Zearalenone in the urine	62
4.5. Conclusions.....	62
CHAPTER VI. General discussion and conclusions.....	63
Appendix 1.....	67
Appendix 2.....	68
Appendix 3.....	69
References.....	70

LIST OF FIGURES

Figure	Page
2.1. Zearalenone and related metabolites and the metabolic pathways which link them.....	5
3.1. Mean zearalenone concentrations in tiller tops and roots between inter-excreta, urine patch and dung patch sites.....	20
3.2. Mean zearalenone yields in tiller tops and roots between inter-excreta, urine patch and dung patch sites.....	22
3.3. Mean zearalenone concentrations in dissected components of ryegrass tillers.....	24
3.4. Mean zearalenone yields concentrations in dissected components of ryegrass tillers.....	26
3.5. Zearalenone concentration in the leaf blade, leaf sheath, mature blade, mature sheath, dead material, daughter tillers, flowering stem, old root and young root components of ryegrass tillers grown in solution containing zearalenone.....	27
3.6. Zearalenone yield in the leaf blade, leaf sheath, mature blade, mature sheath, dead material, daughter tillers, flowering stem, old root and young root components of ryegrass tillers grown in solution containing zearalenone.....	28
4.1. Zearalenone dosing treatment groups	35
4.2. Mean ovulation rate for each treatment group.....	37
4.3. Number of returns in each treatment group.....	37

4.4.	Mean levels of unconjugated (free) zearalenone in the blood of ewes in the OD, IVH, IVL and control groups either grazing pasture or chicory at four times during a 24 hour period after dosing.....	39
4.5.	Mean levels of conjugated zearalenone in the blood of ewes in the OD, IVH, IVL and control groups either grazing pasture or chicory at four times during a 24 hour period after dosing.....	40
4.6.	Levels of alkene zearalenone related metabolites in the blood of oral dosed and control ewes grazed on either chicory pasture.....	41
4.7.	Levels of alkane zearalenone related metabolites in the blood of oral dosed and control ewes grazed on either chicory or pasture.....	41
4.8.	Free and conjugated zearalenone/creatinine ratios in the urine of ewes either grazing pasture or chicory for two days prior to the start of dosing.....	42
4.9.	Free and conjugated zearalenone/creatinine ratios on day 6 of dosing in the urine of the OD, IVL, IVH and control ewes either grazing pasture or chicory.....	43
4.10.	Levels of alkene zearalenone metabolites in the urine of zearalenone dosed and control ewes grazing either chicory or ryegrass pasture.....	44
4.11.	Levels of alkane zearalenone metabolites in the urine of zearalenone dosed and control ewes grazing either chicory or ryegrass pasture.....	44
5.1.	Grazing treatments for each group of 30 synchronised + 80 non-synchronised ewes.....	51
5.2.	Conjugated zearalenone in the blood of ewes grazing either chicory or pasture.....	58

5.3.	Free zearalenone in the blood of ewes grazing either chicory or pasture.....	58
5.4.	Free and conjugated zearalenone in the urine of ewes grazing either chicory or pasture for two weeks prior to mating.....	59

LIST OF TABLES

Table		Page
5.1.	Weight change, ovulation rate, returns to service, and number of lambs carried per ewe in synchronised ewes in each treatment group	56
5.2.	Weight change, returns to service, and number of lambs carried per ewe in non-synchronised ewes in each treatment group	56

LIST OF PLATES

Plate		Page
3.1.	Ryegrass tillers in nutrient solution.....	17
3.2.	Ryegrass tillers dissected into components	18
5.1.	Laparoscopic examination of ovaries.....	53
5.2.	Ewes grazing grass dominant pasture	54
5.3.	Ewes grazing chicory	55

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
<i>Fusarium</i>	Used when describing a particular species
Fusarium	Used when description is non-specific\
fusaria	Used when referred to collectively