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# Proceedings

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## Proceedings

# INTERNAL PARASITES AND ASSOCIATION WITH DIARRHOEA IN SHEEP AT AN ABATTOIR IN WESTERN AUSTRALIA

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## INTRODUCTION

Diarrhoea (scouring) is an important issue for the sheep meat industry. Scouring is a major risk factor for fleece soiling and consequential carcase contamination with microbes that cause meat spoilage and potential dangers for humans (2). There is little information on the causes of scouring in sheep at slaughter. Strongyle worm infections are commonly implicated in scouring and reduced production, yet there is no published data quantifying strongyle infections in scouring and normal sheep at abattoirs. In addition, *Giardia* and *Cryptosporidium* have been associated with scouring in ruminants, but little is known about the prevalence, genotypes present or the effect on production in sheep populations. This study carried out at an abattoir in Western Australia (WA), aimed to investigate the extent of strongyle, *Giardia* and *Cryptosporidium* infections and any association with scouring in sheep.

## MATERIALS AND METHODS

Faecal samples were collected from 367 lines of sheep in lairage at Fletcher's International abattoir in WA from September 2002 to January 2003. 10 sheep were sampled from each "normal" line. A "scouring line" included at least 10 sheep with evidence of active or recent scouring and samples were taken from 10 scouring and 10 normal sheep. Scouring lines were preferentially sampled. Faecal worm egg counts (WEC) excluded *Nematodirus* and were performed on individual samples. Larval differentiations were pooled by line. All samples were screened for *Giardia* and *Cryptosporidium* using microscopy. A random subset of 500 samples was screened with PCR and 106 isolates were genotyped (3). Statistical analysis included non-parametric (Mann-Whitney) tests, Chi-square and odds ratio risk analysis and was performed with SPSS 11.0.

## RESULTS

The results are in Table 1 (protozoa) and Table 2 (scouring and strongyles). Lamb lines were 7.0 (95% confidence intervals (CI): 4.1-11.9) times more likely to be *Giardia*-positive and 3.7 (95% CI: 1.5-9.3) times more likely to be *Cryptosporidium*-positive than adult lines. *Giardia*-positive adult lines were 3.1 (95% CI: 1.2-8.2) times and *Cryptosporidium*-positive adult lines were 9.7 (95% CI: 2.3-41.6) times more likely to be scouring than negative adult lines. There was no association with *Giardia* or *Cryptosporidium* infection and scouring in lamb lines. *Giardia* genotypes isolated were livestock genotype, assemblage A and 2 isolates grouped most closely with the livestock genotype. *Cryptosporidium* genotypes isolated were cervid, bovine B, marsupial and pig II genotypes, *C. suis*, *C. hominis*, *C. andersoni* and a novel genotype (3).

**Table 1. Scouring and faecal worm egg counts in sheep sampled in lairage.**

| | Lambs (< 1 year) | Hoggets (1-2 years) | Adults (>2 years) |
|---|---|---|---|
| Lines scouring in "wet months" | 6/55 | 3/6 | 24/148 |
| Lines scouring in "dry months" | 7/58 | 0/4 | 0/96 |
| Average WEC | 1525[a] epg | 1159[ab] epg | 486[b] epg |
| Lines >1000 eggs per gram (epg) | 43% | 40% | 13% |
| Lines >2000 eggs per gram (epg) | 22% | 30% | 6% |
| Average "scour WEC" in scouring lines | 1512 epg | 1527 epg | 366 epg |
| Average "scour WEC" in normal lines | 1103 epg | 792 epg | 364 epg |
| *p* value (Mann Whitney test) | NS | NS | NS |

Wet months: September and October (sheep grazing predominantly green pasture), dry months: November and January (sheep grazing predominantly dry pasture), mean WEC values within row with different superscripts are significantly different ($p<0.05$), scour WEC = faecal worm egg count excluding *Nematodirus* and *Haemonchus*, NS = no significant difference in WEC in scouring and normal lines within age category ($P>0.05$).

**Table 2. *Giardia* and *Cryptosporidium* results for sheep sampled in lairage.**

| | *Giardia* | *Cryptosporidium* |
|---|---|---|
| Lamb lines positive (age <1 year) | 48% | 11% |
| Adult lines positive (age >1 year) | 13% | 3% |
| Number of genotypes isolated | 4 | 7 |
| Isolates generally not infective to humans | 76% | 98% |

## DISCUSSION

The results suggest that large strongyle burdens are common in lamb lines consigned for slaughter and therefore the economic impact of strongyle infections on sheep meat enterprises warrants quantification. Notwithstanding a degree of faecal concentration and elevation of WEC that would have occurred during transport and lairage, the WEC in the lamb lines were surprisingly high with production losses expected in the considerable proportion of lamb lines with WEC in excess of 1000 epg. Whilst the mean WEC in adult lines was considerably lower, 13% of lines had WEC >1000 epg, suggesting parasite monitoring and management should incorporate all classes of sheep.

The absence of a statistical difference in the scouring and normal lines may be due to the relatively small number of scouring lines sampled and the variable nature of WEC. Other causes of scouring could not be ruled out. In adult sheep, the seasonal pattern of scouring and similar WEC in scouring and normal lines was consistent with the syndrome of hypersensitivity to strongyle larvae ingested from pasture (1). Possible dietary interactions also warrant further investigation.

*Giardia* was more common than *Cryptosporidium* and both organisms were more common in lamb lines than adult lines. These organisms warrant further investigation as both were associated with scouring in lines of adult sheep. Very few isolates found are known to be zoonotic and the public health risk of sheep-derived *Giardia* and *Cryptosporidium* is probably low.

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# TECHNOLOGICAL DEFAULTS BY PENICILLIN RESIDUES IN YOGHURT FROM EWE MILK

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## INTRODUCTION

Antibiotic residues are a risk for human health, due to development of microbial resistance and initiation of allergic reactions after consumption of contaminated food. Consumer health is protected by regular controls of food and the Maximum Residue Limits (MRLs) that have been established by the European Union (1, 2).

Penicillin is widely used for treating sheep; its MRL in ewes' milk has been set at 4 ppb, a level that enssures food safety. However, the technological effects of this substance on dairy fermentation processes are unknown, especially as lactic cultures used are often sensitive to β-lactams. As penicillin concentrations lower than 4 ppb could be legally present in milk for fermentation and dairy products, the aim of this work was to determine the effect of penicillin G at these levels on pH, acidity, D(-)/L(+) lactic acid and bacteria involved in yoghurt preparation.