

A COHORT STUDY TO INVESTIGATE THE ASSOCIATION BETWEEN EWE MILK SOMATIC CELL COUNT AND LAMB WEIGHT

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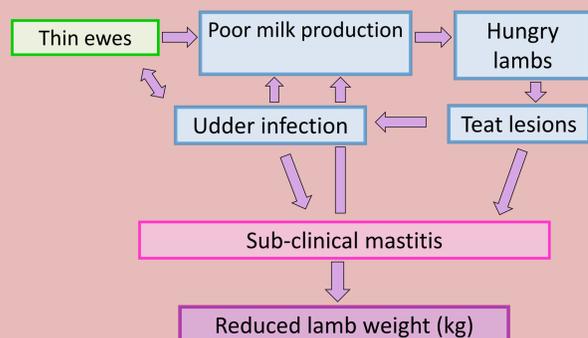
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Introduction

Subclinical mastitis results in a reduced milk yield in dairy ewes¹ and in decreased weight of lambs reared by ewes^{2,3}. Previous studies on the effect of subclinical mastitis on lamb growth have not investigated and accounted for the complex associations of other variables on the longitudinal relationship between subclinical mastitis and lamb weight.

Hypotheses

- A change in lamb weight is associated with
- Somatic cell count (SCC)-subclinical mastitis
- Teat lesions-external damage



Methods

Milk sample and data collection : One farm, January to May 2010.

Data collected:	Ewes (n=67)	Lambs (n=101)
at each observation:	SCC of milk from each udder half	Weight
	Body Condition Score (BCS)	Diarrhoea
	Teat damage	Orf
	Abnormalities of the udder or milk	
at lambing only	Litter size	sex



Images from S. Cooper

Cohorts followed

Cohort	Breed	Age	Number of lambs
1 (n=16)	Suffolk mules	2 and 6 yrs	1
2 (n=22)	Suffolk mules	2 and 6 yrs	≥2
3 (n=17)	North of England mules	9 yrs	1
4 (n=12)	North of England mules	9 yrs	≥2

Data analysis using multilevel linear regression models

MLwiN 2.11 (Centre for Multilevel modelling, University of Bristol)

Lamb weight model:

Dependent variable: lamb weight (kg)

Random effects: ewe, lamb and observation as levels 3, 2 and 1

Somatic cell count model:

Dependent variable: \log_{10} SCC (cells/ml)

Random effects: ewe, udder-half and observation as levels 3, 2 and 1

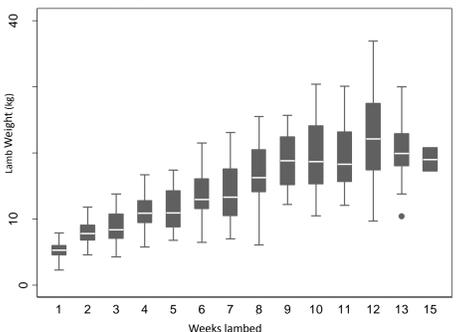
Results

Data summary

Variable	ewes (n=67)	Variable	Lambs (n=101)
Rearing singles	35	Female	42
Rearing twins	31	Male	59
Rearing triplets	1	Orf (at any observation)	16
≥ 1 teat lesion (at any observation)	41	Diarrhoea (at any observation)	25

Lamb weight

Mean lamb weight with 95% confidence intervals by age of lamb in weeks



Lamb weight model

After accounting for lamb age, birth weight, litter size, whether the lamb had diarrhoea, and supplementary concentrate fed to the ewe before lambing, **lower lamb weights were associated with:**

higher ewe mean SCC

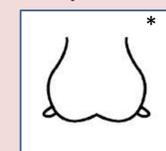
Lambs reared by ewes with a mean \log_{10} SCC of above 5.6 (400,000 cells per ml) weighed on average 1.4kg [-2.1,-0.7] less at that observation.

the observation of a new teat lesion

Lambs reared by ewes on which a "non-traumatic" teat lesion (warts, spots, orf) was at that visit weighed 0.5kg less [-1.0, 0.1] (significant at 90%)[†].

Lambs reared by ewe on which a "traumatic teat lesion" (bites tears and chapping) was observed at the previous visit weighed 0.9kg less [-1.4, -0.1].

teat position



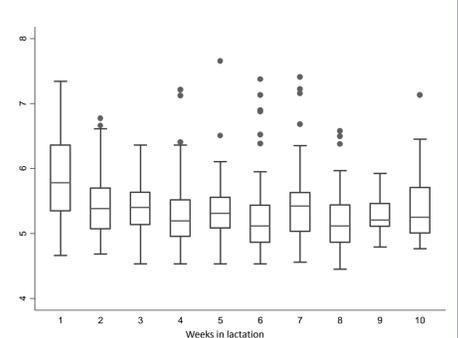
The teat position associated with heavier lambs was at 4 and 8 o'clock. Lambs reared by ewes with the most medial teat positions weighed on average 1.4kg less [-2.5,-0.3] and those in the more lateral teat positions weighed up to 1.5kg [-2.6, -0.4] less than those reared by ewes with teats in the 4 or 8 o'clock position.

[†] Significance set at 0.05 unless otherwise stated * Images adapted from Casu et al., 2006⁴

Lambs reared by ewes that were **9 years old** weighed on average 2.4 kg less [-3.4,-1.5] at each observation than those reared by ewes that were 6 years old. Lamb gender, ewe body condition, breed and udder size were non significant variables.

Somatic cell count

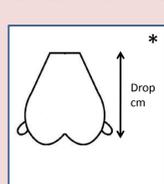
\log_{10} SCC with 95% confidence intervals by weeks in lactation



Somatic cell count model

After accounting for days in lactation and average lamb weight, **SCC was significantly higher in:**

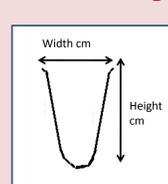
ewes with a lower udder drop



For every increase of 1 cm in udder drop there was an associated 0.04 increase in \log_{10} SCC [0.01, 0.07]

(where "lower" is a greater distance (in cm) as measured from base to the apex at the bifurcation of the udder with the ewe standing).

ewes with a greater cross-sectional area of both teats



For every 1 cm² increase in total teat cross-sectional area, there was an associated 0.03 [0.01, 0.05] increase in \log_{10} SCC.

old and thin ewes



9 year old ewes of BCS<3 in lactation and 6 year old ewes in BCS of <2 in lactation had significantly higher SCCs when compared to young fit ewes (2 years old and of BCS>3).

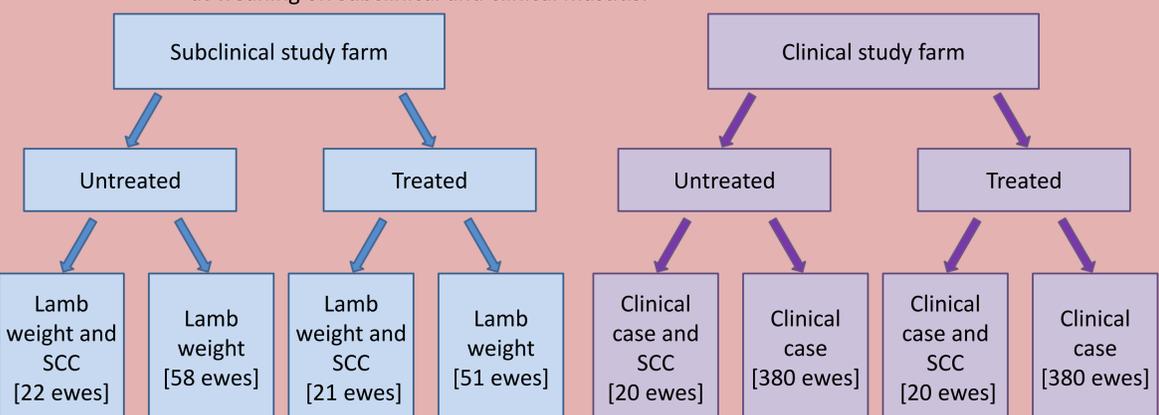
For example, the thinnest 9 year old ewes of BCS>2 had a 0.27 higher \log_{10} mean SCC and thinnest 6 year old ewes had an increase of 0.70 0.27 higher \log_{10} mean SCC [0.23,1.17].

Conclusions

After controlling for ewe and lamb variables, lower lamb weight can be explained by subclinical udder infection of the ewe and the occurrence of teat lesions. There is an association between udder conformation and the level of SCC and lamb growth which warrants further investigation. By improving knowledge of the dynamics of SCC, we provide further understanding of how to maintain udder health of ewes in order to benefit to farmers with ewes rearing lambs for the meat industry.

Further work

Intervention study to assess the effect of a broad spectrum intramammary "dry off" antibiotic at weaning on subclinical and clinical mastitis.



Acknowledgements

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