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Genetics of wool shedding

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Thanks

- To the organisers for asking me to speak today
- To Sheep Improved Genetics Ltd
- To Wiltshire Improved Genetics Group
- To Genesis-Faraday for funding a SPARK award



Today's objectives

- Outline what we have learnt about the genetics of wool shedding
- Understand how this could be applied in practice
- Some suggestions for the future



Main messages

- Wool shedding is genetically controlled
- Shedding genetics should be thought of in 2 parts
 - 1) A single gene switches on the ability to shed
 - 2) Within shedders, there are genetic differences in speed/extent of shedding
- Not all lambs shed, even though they shed as adults

Mendelian genetic tests

- Carried out a range of analyses on data from 1st-cross (F_1) and backcross lambs, shedders and non-shedders
- Best result indicated a dominant gene on a non-sex chromosome (not linked to sex of the animal)
- This means that an animal carrying at least one copy of the gene will shed its wool (Shedding switch gene)
- Not always true for lambs



Shedding in lambs

- First-cross lambs classified as shedders or non-shedders based on their lifetime performance
- 11% of shedders did not shed as a lamb

Possible reasons

- Scored before shedding commenced
- Gene not expressed in first year
- Environmental factor inhibited shedding



1st key message

If you want your sheep to shed then they need to have at least one copy of the shedding 'switch' gene

Where can you get a copy of the shedding 'switch' gene?

- No molecular genetic test at present
- Most purebred Wiltshire Horns and Easycares probably carry 2 copies (Also Dorpers and Katahdins used in this study)
- Shedding sheep derived from these breeds will carry one or two copies, depending on:
 - breeding e.g. WH x WH – all lambs 2 copies
 - chance e.g. F_1 x F_1 gives $\frac{1}{4}$ non-shedders; $\frac{1}{2}$ 1 copy; $\frac{1}{4}$ 2 copies.

Possible breeding outcomes (%)

Ram	Ewe	Lamb SS	Lamb SN	Lamb NN
SS	NN	0	100	0
SS	SN	50*	50*	0
SS	SS	100	0	0
SN	NN	0	50	50
SN	SN	25*	50*	25
SN	SS	50*	50*	0
NN	NN	0	0	100
NN	SN	0	50	50
NN	SS	0	100	0

SS – Shedder; 2 copies of shedding switch gene

SN – Shedder; 1 copy of shedding switch gene

NN – Non-shedder; 0 copies of shedding switch gene

* Cannot distinguish SS from SN using shedding records

2nd key message

If you have a pedigree recorded flock of shedders you can improve the speed/extent of shedding in your flock by selection on EBV, probably as part of an index

Options for introducing wool shedding sheep to your farm

1. Breed pure using stock from a purebred shedding breed e.g. Wiltshire Horn, Easycare, Exlana
2. 'Grade-up' your non-shedding flock using purebred shedding rams and backcross for several generations
3. Introduce the shedding 'switch' gene into your non-shedding flock and then spread it through the flock

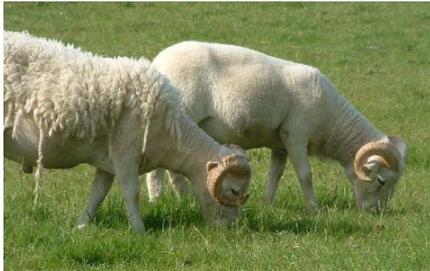
All these options have costs and technical challenges

What next?

- Genetic test – non-shedding lambs and crosses
- More records – better EBV
- Effect of breed type on wool score amongst shedders
- Correlations with other traits



Thanks for listening



Any questions?



What affects wool score in lambs?

- Age (older lambs have higher scores)
- Sex (females higher than males)
- Birth type (Singles higher than twins/triplets)
- Year
- Genetic type (BC higher than F_1 ; Breed differences)

But not

- Liveweight
- Age of dam

What affects wool score in older animals?

- Age (older animals have higher scores than lambs)
- Year
- Genetic type (BC higher than F_1 ; Breed differences)

But not

- Liveweight
- Age of dam
- Sex
- Birth type