

Crossbred versus purebred ewe genotypes for the hill sheep sector

Effects on finishing lamb performance

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Introduction

- 57.3% breeding ewes in Northern Ireland are found in Severely Disadvantaged Areas (SDAs)
(DARD, 2005)
- Output from hill flocks is often constrained by:
 - ❖ High proportion of barren ewes
 - ❖ Small litter sizes
 - ❖ Low levels of lamb performance
(Carson et al., 2001)
- CAP Reforms - future sustainability will depend on improving production efficiency and increasing market returns

Introduction

- Hill sheep systems in the UK are dominated by purebred ewe genotypes, mainly Scottish Blackface
(DEFRA, 2004)
- Crossbreeding could be used to introduce complimentary traits to improve ewe fertility as well as lamb growth and carcass traits
- Retaining Lleyn X BF or Texel X BF females increased lamb output at weaning by up to 10% compared with purebred Blackface ewes
(Speijers et al., 2007)
- Are there benefits of retaining crossbred hill ewes for lamb performance and carcass quality?



Aim of study

To investigate the effects of switching from pure-bred to crossbred hill ewe genotypes on:

1. Lamb performance during the finishing period
2. Carcass characteristics

Materials and Methods

- Crossbreeding study carried out on 6 hill flocks around Northern Ireland
- On each farm 400 Blackface ewes (200/year) crossed with Blackface, Cheviot, Swaledale, Lleyne and Texel rams
- F1 females retained for breeding at 18 months old
- Mated to Texel, Lleyne and Dorset rams in single sire mating groups, balanced for ewe live weight, genotype, BCS and age
- Over a 2 year period, 588 entire male and female F2 lambs ($33 \pm 6.8\text{kg}$) moved after weaning to a central location for finishing (n=296 Year 1; n=292 Year 2)

Materials and Methods

- Lambs housed in groups of 6 and allocated to one of four treatments, balanced for ewe genotype, ram genotype, farm of origin and sex
- 122 lambs (n=60 Year 1; n=62 Year 2) representative of each treatment slaughtered pre-finishing for determination of initial carcass weight
- Finished on one of four ad lib concentrate diets with feed intake determined daily
- Lambs weighed at weekly intervals and immediately prior to slaughter.
- Target slaughter weights:
 - ❖ Males: 42 or 50 kg
 - ❖ Females: 38 or 46 kg

Materials and Methods

- Carcass conformation scored on a 5 point scale based on the EUROP system (E=5, P=1)
- Carcass fat class scored on a 6 point scale (1=1, 2=2, 3=3, 4L=4, 4H=4.5, 5=5)
- Cold carcass weight recorded after 48 h chill at 4° C
- Carcass fat depth measured to the nearest 0.01mm using a digital vernier calliper
- Data analysed using Regression Analysis to adjust means to a 20kg carcass weight.
 - ❖ Fixed effects: Ewe genotype X Diet
 - ❖ Covariates: Year, farm of origin, ram genotype and sex

1. Effect of ewe genotype on lamb performance

	BXB	SWXB	CHXB	LLXB	TXB	s.e.d	Sig.
Daily DMI (kg/d)	1.17 ^{ab}	1.13 ^a	1.15 ^{ab}	1.16 ^{ab}	1.17 ^b	0.019	**
FCR	6.06	6.28	5.66	6.45	5.85	0.368	NS
Daily LWG (g/d)	225	205	233	212	230	11.4	P=0.07
Killing-out %	45.5	45.1	45.3	46.0	45.3	0.44	NS
Daily CWG (g/d)	132	129	132	127	143	6.6	P=0.09

(**B**, Scottish Blackface; **SW**, Swaledale; **CH**, Cheviot; **LL**, Lleyn; **T**, Texel)

2. Effect of ewe genotype on lamb carcass characteristics

	BXB	SWXB	CHXB	LLXB	TXB	s.e.d	Sig.
Conformation score	2.87 ^a	2.82 ^a	3.04 ^b	3.05 ^b	3.13 ^b	0.078	***
Fat score	3.66 ^b	3.62 ^b	3.40 ^a	3.55 ^{ab}	3.40 ^a	0.089	**
Carc. length (mm)	531 ^a	546 ^b	536 ^a	534 ^a	532 ^a	4.5	**
Barrel width (mm)	245	242	245	246	247	2.1	P=0.06
Shldr width (mm)	215	213	217	216	218	2.2	NS
Side depth (mm)	364	375	368	367	366	3.4	NS
Circ. buttocks (mm)	455	458	453	455	453	4.6	NS

(**B**, Scottish Blackface; **SW**, Swaledale; **CH**, Cheviot; **LL**, Lleyn; **T**, Texel)

3. Effect of ewe genotype on carcass fat depth (mm)

	BXB	SWXB	CHXB	LLXB	TXB	s.e.d	Sig.
KKCF (g)	467 ^b	531 ^b	377 ^a	456 ^b	373 ^a	36.6	***
<i>L. dorsi</i>	3.9 ^b	3.8 ^b	3.4 ^{ab}	3.8 ^b	3.1 ^a	0.32	*
<i>Iliocostalis</i>							
Internal	11.6	6.9	8.7	6.2	5.5	3.64	NS
External	7.0 ^b	6.9 ^b	6.5 ^{ab}	7.0 ^b	5.8 ^a	0.47	*
<i>Gluteus medius</i>	5.3 ^{bc}	5.4 ^c	4.6 ^{ab}	5.0 ^{abc}	4.2 ^a	0.39	*
<i>Obliquus internus</i>	8.4	8.4	7.7	8.0	7.3	0.53	NS

(B, Scottish Blackface; SW, Swaledale; CH, Cheviot; LL, Lleyn; T, Texel)

Conclusions

- Significant potential to improve lamb carcass quality from the hill sheep sector by using upland or terminal sires to produce crossbred replacement females

- Compared with purebred Scottish Blackface ewes, retaining crossbred ewes with Texel and Cheviot genes:
 - ❖ Had no significant effects on lamb performance
 - ❖ Increased carcass conformation score
 - ❖ Reduced carcass fat score and fat depth over several retail cuts
 - ❖ Had no effect on carcass linear measurements

- Inclusion of Swaledale genes had no effects on animal performance or carcass characteristics compared with purebred Blackface

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