

# Crossbred ewe performance in the Welsh hills

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## **Introduction**

Incomes of hill farms measured by gross margin per farm have decreased by 45% over the last 20 years. This in turn has put increased constraints on labour available for specific tasks during the sheep year. Consequently, farmers must identify and adopt potential changes to their current systems to maintain incomes and minimise labour inputs.

Increasing the productivity and improving the quality of their stock are practical options which could be achieved by changing to a bigger hill ewe, improving the genetic base of their current stock or by introducing crossbred ewes. Using a bigger hill breed would increase kg of lamb produced per ewe but would not necessarily meet current market requirements in terms of conformation or fat class. Improving the genetic base of a flock is a long-term investment even when part of a group breeding scheme. Although hill farmers do produce crossbred lambs, traditionally the female lambs are sold to farmers in the uplands or lowlands for crossing with a terminal sire breed and the male lambs become part of the slaughter generation. The hybrid vigour associated with a crossbred ewe is then capitalised by the upland or lowland farmer rather than the hill farmer. Switching to a crossbred ewe in the hills could offer advantages in that kg of lamb per ewe would be increased; and using crossing sires with desirable conformation traits and lean:fat ratios, lambs produced would be nearer to market requirements. However, the question remains as to whether the hybrid vigour of the crossbred ewe can be exploited in the hills, and whether traits such as hardiness are compromised.

## **Objectives of the project**

The overall objective of the project is to monitor the physical and financial performance of crossbred ewes under a hill management system. The project has two phases, Phase 1 was the production phase with Phase 2 being the evaluation phase.

During Phase 1, the objective was to monitor the physical performance of crossbred lambs produced from pure bred Welsh Mountain ewes under a hill management system. The results of Phase 1 have been reported for HCC in “Crossbred lamb production in the hills”.

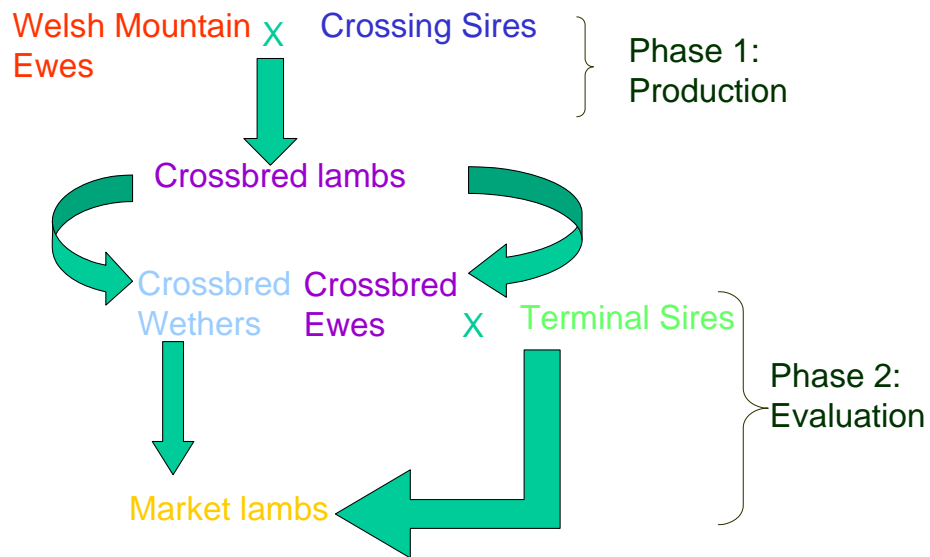
During Phase 2, the objective is to monitor the performance of crossbred ewes over three lamb crops in the hill environment (5 years in total).

This report will deal only with the initial results of Phase 2 – the evaluation phase and will focus on the performance of the ewe lamb replacements, the primiparous ewes and the performance of the terminal lambs from the first three years. Preliminary data on multiparous ewes can be found in appendix 1.

## **Methodology**

In order to produce crossbred ewes for evaluation in the hills, a stepwise approach was taken to the project. In Phase 1, crossing sires were mated to Welsh Mountain ewes. The breeds used were Cheviot, Dorset (Poll), Lleyn and Texel. Each breed was chosen for a particular trait. The Cheviot was chosen for the increase in size of frame whilst maintaining hardiness. The Dorset was chosen for reproductive performance in terms of a wider breeding season and earlier maturity. The Lleyn was chosen for its maternal characteristics and finally the Texel was chosen for its terminal sire qualities. 50 ewe lambs from each breed and in each of 3 years were retained for breeding. All male lambs were finished and sent for slaughter. During phase 2, which is on-going, crossbred ewes are being mated to a terminal sire and all lambs will be finished and sent for slaughter. The overall scheme is shown diagrammatically below in Figure 1.

**Figure 1: Diagrammatic representation of the stepwise breeding programme**



The performance of the crossbred ewes over three lamb crops will be monitored (5 years). Lifetime performance beyond three lamb crops will also be monitored for crossbred ewes still in fit condition.

## **Experimental Protocol**

Over a 3 year period (2000 – 2002), a total of 1,800 matings were achieved. In October of each year, 600 Welsh Mountain ewes were selected and allocated to mating groups balanced for age, liveweight and condition score. The four breeds of crossing sires were used in each year. In year 1, two rams of each breed were mated with 75 ewes each and in years 2 and 3, three rams of each breed were mated to 50 ewes each. Over the course of the three years 8 rams of each breed were used as crossing sires. All ewes underwent laproscopic intra-uterine insemination.

All rams were performance recorded and sourced from sire reference schemes. All sires were in the top 20% of the schemes. In year 1, all rams were brought to Pwllpeiran and semen was collected and used on the day with the exception of one Cheviot sire where frozen semen was used. However, in year 2 only frozen semen was used and in year 3 fresh chilled semen was used. This was as a result of biosecurity measures put into place post Foot and Mouth Disease.

All lambs were weighed at birth, 5, 10 and 16 weeks of age. Lambs were weaned at 16 weeks of age. From 16 weeks of age, male lambs were assessed fortnightly for those that had reached a finished condition of fat class 2/3L. Fifty ewe lambs of each cross in each year were selected in September of each of the 3 years and retained as crossbred ewes for phase 2 of the project. Ewe lambs retained for breeding were away-wintered. Female lambs not retained for breeding were finished on farm and sent for slaughter when a finished condition of 2/3L had been reached.

Ewe lambs were weighed prior to away-wintering, with the exception of year 1 due to Foot and Mouth Disease constraints. On return from away-wintering all ewe lambs were weighed and ultrasonically scanned to measure eye muscle depth and fat depth at the third lumbar vertebra. Ewe lambs were then returned to hill grazings where they remained until shearing.

At shearing, all ewe lambs were weighed and condition scored. In addition, for the first two ewe lamb cohorts, all fleeces were weighed and graded. All gradings were carried out by a British Wool Board inspector. Ewe lambs were

returned to hill pastures until 3 weeks prior to tupping when they were brought down to in-bye land for flushing. Prior to tupping all ewe lambs were weighed and condition scored. A cohort of fifty pure-bred Welsh Mountain ewe lambs were also included in each year and joined the crossbred flock prior to tupping. In subsequent years, multiparous ewes were also weighed and condition scored prior to tupping. Body condition scoring was on a tactile measure based on a scale of 1 – 5 to the nearest quarter score, where 1 was too thin and 5 was obese.

Suffolk rams were chosen as the terminal sire for the evaluation phase. All rams were sourced from the Suffolk Sire Reference Scheme and were in the top 20% of the scheme. In each year, 10 rams were used as terminal sires. Natural service was used. After 4 weeks Suffolk rams were removed from the groups and sweeper rams used to cover any repeats.

All females were pregnancy scanned in early January and all twin-bearing ewes housed. In years 2 and 3 of the evaluation phase all primiparous ewes were also housed.

All lambs were weighed at birth, 8 and 18 weeks of age. Lambs were weaned at 18 weeks of age. From weaning, all lambs were assessed fortnightly for those that had reached a finished condition of fat class 2/3L. Prior to being sent to slaughter, all lambs were weighed on-farm to obtain a final finished liveweight and were ultrasonically scanned for eye muscle and back fat depth. Hot carcass weights and gradings were obtained on the day from the abattoir where possible.

All ewes that were housed were condition scored within 12 hours of lambing. All ewes were subsequently weighed and condition scored when the lambs were weaned.

Data relating to the crossbred ewes has been analysed as a number of data sets. The first data set relates to the crossbred ewe lambs only from away-wintering to first lambing. The second data set relates to primiparous ewes from tupping through to weaning.

Data relating to the lambs was dealt with as one data set.

All data was analysed using REML function in Genstat.

## Results

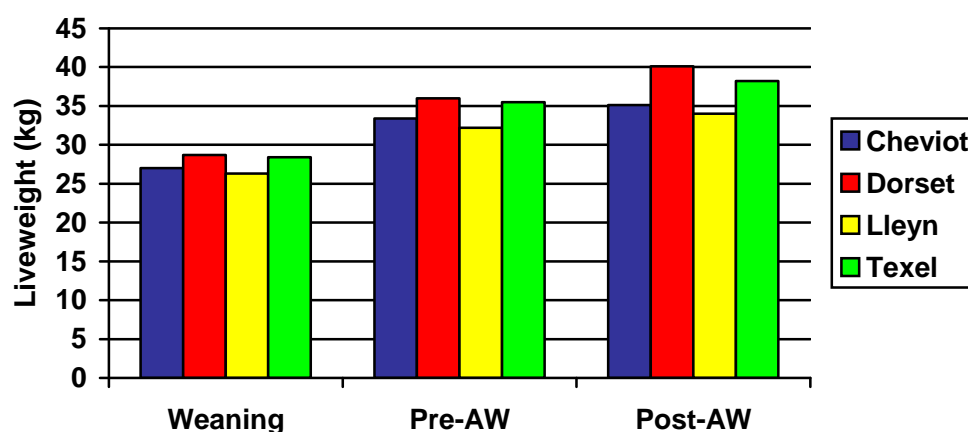
### *Crossbred ewe lambs*

Over the three years of the production phase (Phase 1) 150 ewe lambs of each cross were selected for retention as breeding stock. Selection of ewe lambs was based on physical performance of individual lambs, sound feet and teeth, and phenotypically were true to type. The average liveweights of the crossbred ewe lambs at weaning (16 weeks), pre and post away-wintering are given in Table 1 and are depicted in Figure 2 below. The average liveweights for pre away wintering are based on 2<sup>nd</sup> and 3<sup>rd</sup> cohorts of ewe lambs only.

**Table 1: Predicted mean liveweight (kg) of crossbred ewe lambs at weaning (16 weeks), pre and post away-wintering**

	Cheviot	Dorset	Lleyn	Texel	SED	Sig
<b>Weaning</b>	27.0 <sup>a</sup>	28.7 <sup>b</sup>	26.3 <sup>a</sup>	28.4 <sup>b</sup>	0.52	***
<b>Pre away wintering</b>	33.4 <sup>a</sup>	36.0 <sup>b</sup>	32.2 <sup>a</sup>	35.5 <sup>b</sup>	0.82	***
<b>Post away wintering</b>	35.1 <sup>a</sup>	40.1 <sup>c</sup>	34.0 <sup>a</sup>	38.2 <sup>b</sup>	0.65	***

**Figure 2: Predicted mean liveweight (kg) of crossbred ewe lambs at weaning (16 weeks), pre\* and post away-wintering (AW)**



\* Average pre-away-wintering liveweights based on 2<sup>nd</sup> and 3<sup>rd</sup> cohorts of ewe lambs only.

Dorset X (28.7 kg) and Texel X (28.4 kg) ewe lambs were significantly (P<0.01) heavier at weaning compared to the Cheviot X (27.0 kg) and Lleyn X (26.3 kg) ewe lambs. Pre-away wintering liveweights were significantly

heavier ( $P<0.01$ ) for Dorset X and Texel X ewe lambs compared to Cheviot X and Lleyn X ewe lambs (36.0 and 35.5 kg vs. 33.4 and 32.2 kg respectively).

On return from away wintering, Dorset X ewe lambs were significantly ( $P<0.01$ ) heavier (40.1 kg) than Texel X ewe lambs (38.2 kg) which were in turn significantly heavier ( $P<0.01$ ) than Cheviot X (35.1 kg) or Lleyn X (34.0 kg) ewe lambs.

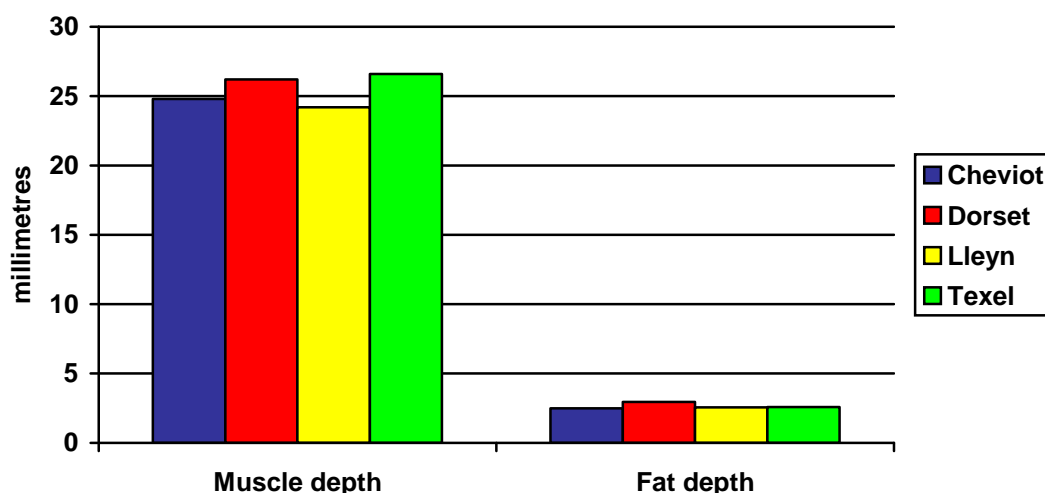
All crossbred ewe lambs were ultrasonically scanned for eye muscle depth and fat cover at the third lumbar vertebra on return from away wintering. The predicted mean muscle depth and fat depth measurements are given in Table 2 and depicted graphically in Figure 3.

**Table 2: Predicted mean eye muscle and fat depth measured ultrasonically at the third lumbar vertebra**

	Cheviot	Dorset	Lleyn	Texel	SED	Sig
<b>Muscle depth (mm)</b>	24.8 <sup>a</sup>	26.2 <sup>b</sup>	24.2 <sup>a</sup>	26.6 <sup>b</sup>	0.42	***
<b>Fat depth (mm)</b>	2.49 <sup>a</sup>	2.94 <sup>b</sup>	2.55 <sup>a</sup>	2.58 <sup>a</sup>	0.007	***

Texel X and Dorset X ewe lambs had a significantly ( $P<0.01$ ) greater eye muscle depth (26.6 mm and 26.3 mm respectively) compared to Cheviot X (24.8 mm) and Lleyn X (24.2 mm) ewe lambs. Dorset X ewe lambs had significantly greater fat depth (2.94 mm) compared to the other cross bred ewe lambs (2.49, 2.55 and 2.58 mm for Cheviot X, Lleyn X and Texel X respectively).

**Figure 3: Predicted mean eye muscle and fat depth measured ultrasonically at the third lumbar vertebra**



The crossbred ewe lambs (hoggets) were returned to the hill on return from away wintering until shearing. At shearing, the hoggets were weighed and condition scored. In addition, individual fleeces were weighed and graded for the 1<sup>st</sup> and 2<sup>nd</sup> cohorts. The results for shearing measurements are given in Table 3.

**Table 3: Predicted mean liveweight, condition score and fleece weight at 1<sup>st</sup> shearing.**

	Cheviot	Dorset	Lleyn	Texel	SED	Sig
<b>Liveweight (kg)</b>	39.3 <sup>a</sup>	43.8 <sup>c</sup>	38.0 <sup>a</sup>	41.7 <sup>b</sup>	0.80	***
<b>Condition Score</b>	3.27 <sup>b</sup>	3.42 <sup>c</sup>	3.14 <sup>a</sup>	3.25 <sup>b</sup>	0.05	***
<b>Fleece weight (kg)</b>	2.14 <sup>a</sup>	2.92 <sup>c</sup>	2.38 <sup>b</sup>	2.52 <sup>b</sup>	0.10	***

The Dorset X hoggets were significantly heavier ( $P < 0.01$ ) at shearing than the Texel X hoggets (43.8 kg vs. 41.7 kg respectively). Both Dorset X and Texel X hoggets were significantly heavier than either Cheviot X (39.3 kg) or Lleyn X (38.0 kg). The condition scores for all hoggets were 3 or greater. This is an acceptable condition score for hoggets at this time. The Dorset X hoggets had significantly higher ( $P < 0.01$ ) condition score than the other crossbred

hoggets (3.42). The Lleyn X hoggets had a significantly lower ( $P<0.01$ ) condition score (3.14) than the other crossbred hoggets. The condition scores for the Cheviot X (3.27) and the Texel X (3.25) hoggets were similar. The predicted mean fleece weight was significantly heavier ( $P<0.01$ ) for the Dorset X hoggets (2.92 kg) compared to the fleece weights of the other crossbred hoggets. The fleece weight for the Cheviot X hoggets (2.14 kg) was significantly ( $P<0.01$ ) lighter than the other crossbred hoggets. Fleece weights were similar for the Lleyn X (2.38 kg) and the Texel X hoggets (2.52 kg). The Dorset X fleeces also graded better than the other crossbred hogget fleeces.



### **Primiparous ewes**

All ewes were weighed and condition scored prior to tugging in each year. There were significant differences ( $P < 0.01$ ) in tugging weights and condition score between years. The results for tugging weight for each crossbred and each year are given in Table 4 and in Table 5 for condition score. The overall predicted mean tugging weight and condition score for each crossbred is depicted in Figures 4 and 5 respectively.

**Table 4: Predicted mean tugging weights (kg) for primiparous crossbred ewes in three consecutive years**

	2002/3	2003/4	2004/5	SED	SIG	Overall (breed)	SED	SIG
<b>Cheviot</b>	42.4 <sup>a</sup>	41.8 <sup>ab</sup>	42.0 <sup>a</sup>	1.14	***	42.1 <sup>a</sup>	0.66	***
<b>Dorset</b>	43.9 <sup>a</sup>	43.0 <sup>a</sup>	42.0 <sup>a</sup>			43.0 <sup>a</sup>		
<b>Lleyn</b>	37.8 <sup>cd</sup>	40.3 <sup>a</sup>	38.9 <sup>bd</sup>			39.0 <sup>b</sup>		
<b>Texel</b>	40.3 <sup>a</sup>	44.8 <sup>e</sup>	42.8 <sup>a</sup>			42.7 <sup>a</sup>		
<b>Welsh</b>	39.0 <sup>bd</sup>	35.5 <sup>c</sup>	36.1 <sup>c</sup>			36.9 <sup>a</sup>		
<b>Overall (years)</b>	40.7	41.1	40.4	0.51	ns			

**Table 5: Predicted mean condition score at tugging for primiparous crossbred ewes in three consecutive years**

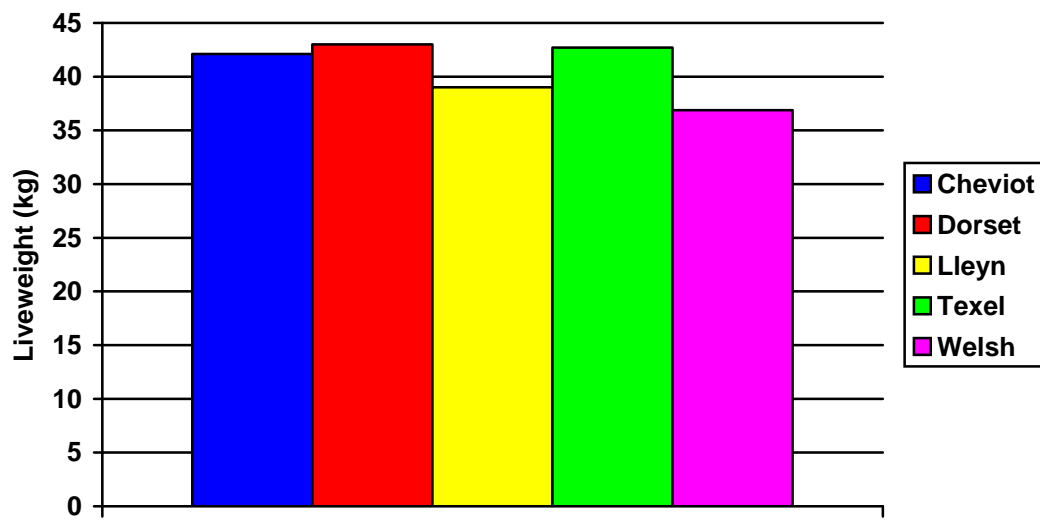
	2002/3	2003/4	2004/5	SED	SIG	Overall (breed)	SED	SIG
<b>Cheviot</b>	3.48 <sup>a</sup>	2.87 <sup>bc</sup>	2.92 <sup>cd</sup>	0.11	***	3.09 <sup>a</sup>	0.07	**
<b>Dorset</b>	3.54 <sup>a</sup>	2.68 <sup>ab</sup>	3.13 <sup>de</sup>			3.11 <sup>a</sup>		
<b>Lleyn</b>	3.08 <sup>c</sup>	2.67 <sup>ab</sup>	3.01 <sup>ce</sup>			2.92 <sup>b</sup>		
<b>Texel</b>	3.40 <sup>a</sup>	2.72 <sup>a</sup>	3.16 <sup>e</sup>			3.09 <sup>a</sup>		
<b>Welsh</b>	3.60 <sup>a</sup>	2.54 <sup>a</sup>	2.97 <sup>cde</sup>			3.04 <sup>ab</sup>		
<b>Overall (years)</b>	3.42 <sup>a</sup>	2.70 <sup>b</sup>	3.04 <sup>c</sup>	0.05	***			

Overall, Welsh Mountain ewes were significantly lighter ( $P < 0.001$ ) than the crossbred ewes at 1<sup>st</sup> tugging, with a mean liveweight of 36.9 kg. The Lleyn X ewe was significantly ( $P < 0.001$ ) lighter than the other crossbred ewes with a

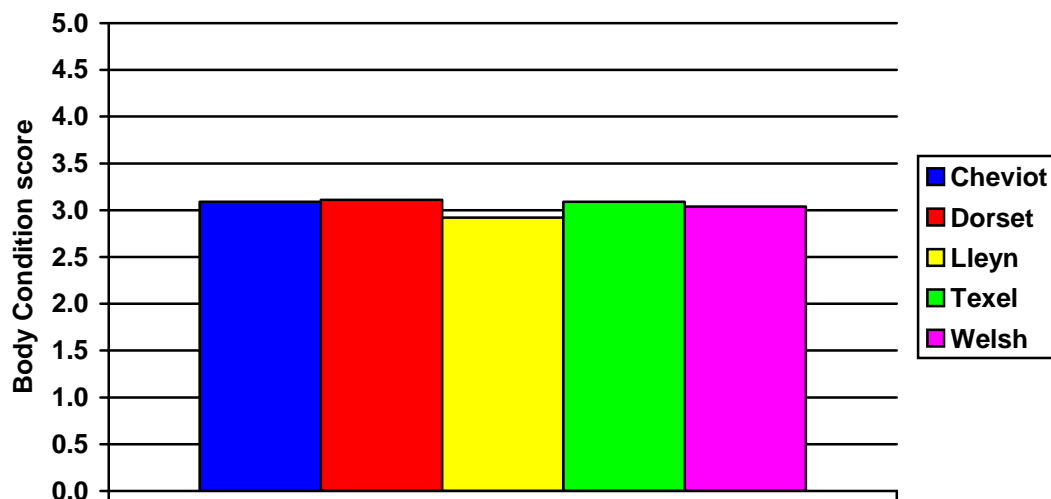
mean liveweight of 39.0 kg). The liveweight of the Cheviot X (42.1 kg), the Dorset X (43.0 kg) and the Texel X (42.7 kg) were similar at 1<sup>st</sup> tupping.

In 2002/3, the ewes were in a significantly higher ( $P < 0.001$ ) body condition score (3.42) than in 2003/4 (2.70) and 2004/5 (3.04). In 2003/4, the ewes were in a significantly lower ( $P < 0.001$ ) body condition score than 2004/5.

**Figure 4: Predicted mean liveweight of crossbred ewes at 1<sup>st</sup> tupping**



**Figure 5: Predicted mean body condition score of crossbred ewes at 1<sup>st</sup> tupping**



The condition score of ewes at tupping can have a substantial impact on the reproductive performance of the ewe. A target condition score of 2.5 – 3.0 is

acceptable for hill ewes and this was achieved for each breed overall. However, ewes in 2002/3 were on average almost half a score above of the target range.

The predicted mean litter size at birth and the number lambs reared through to weaning for each year and crossbred type are given in Tables 6 and 7 respectively. Overall, the litter size was significantly smaller ( $P < 0.001$ ) in 2003 and 2004 compared to 2005 (1.25, 1.32 and 1.45 respectively) however there was no significant difference in litter size in 2003 and 2004. Overall, Dorset X and Lleyn X ewes had the largest litters (1.42 and 1.46 respectively) and the pure-bred Welsh Mountain ewes had the smallest litters (1.18). The litter size for Cheviot X (1.32) and Texel X (1.30) ewes was similar. Lleyn X ewes had significantly larger ( $P < 0.001$ ) litters than Cheviot X, Texel X and Welsh Mountain ewes. Welsh Mountain ewes had significantly smaller ( $P < 0.001$ ) litters than Cheviot X, Dorset X and Lleyn X ewes.

**Table 6: Predicted mean litter size (lambs per ewe) for each crossbred in each year**

	2003	2004	2005	SED	SIG	Overall (breed)	SED	SIG
<b>Cheviot</b>	1.19 <sup>ab</sup>	1.28 <sup>abc</sup>	1.49 <sup>c</sup>	0.11	*	1.32 <sup>a</sup>	0.06	***
<b>Dorset</b>	1.34 <sup>bcd</sup>	1.53 <sup>d</sup>	1.40 <sup>bcd</sup>			1.42 <sup>ab</sup>		
<b>Lleyn</b>	1.45 <sup>cd</sup>	1.38 <sup>bcd</sup>	1.56 <sup>d</sup>			1.46 <sup>b</sup>		
<b>Texel</b>	1.07 <sup>a</sup>	1.30 <sup>abc</sup>	1.53 <sup>d</sup>			1.30 <sup>ac</sup>		
<b>Welsh</b>	1.19 <sup>ab</sup>	1.10 <sup>a</sup>	1.27 <sup>ab</sup>			1.18 <sup>c</sup>		
<b>Overall (years)</b>	1.25 <sup>a</sup>	1.32 <sup>a</sup>	1.45 <sup>b</sup>	0.05	***			

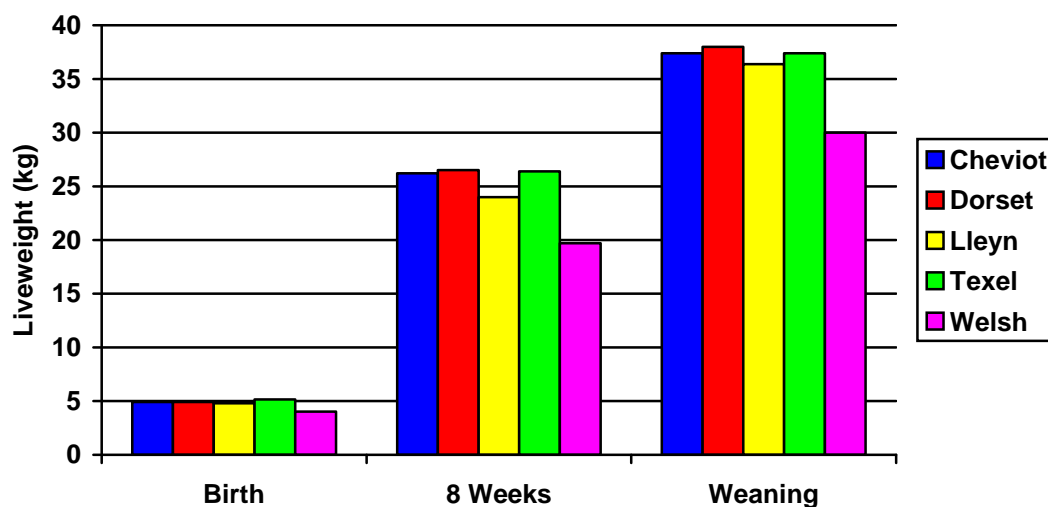
**Table 7: Predicted mean number of lambs reared per ewe through to weaning for each crossbred in each year**

	2003	2004	2005	SED	SIG	Overall (breed)	SED	SIG
<b>Cheviot</b>	0.83 <sup>ab</sup>	1.18 <sup>def</sup>	1.23 <sup>def</sup>	0.13	**	1.08 <sup>ab</sup>	0.08	***
<b>Dorset</b>	1.09 <sup>bcde</sup>	1.36 <sup>f</sup>	1.28 <sup>def</sup>			1.24 <sup>b</sup>		
<b>Lleyn</b>	1.27 <sup>def</sup>	1.04 <sup>abcd</sup>	1.33 <sup>ef</sup>			1.21 <sup>b</sup>		
<b>Texel</b>	0.79 <sup>a</sup>	1.03 <sup>abcd</sup>	1.39 <sup>f</sup>			1.07 <sup>a</sup>		
<b>Welsh</b>	1.04 <sup>abcd</sup>	0.88 <sup>abc</sup>	1.14 <sup>def</sup>			1.02 <sup>a</sup>		
<b>Overall (years)</b>	1.00 <sup>a</sup>	1.10 <sup>a</sup>	1.27 <sup>b</sup>	0.06	***			

Significantly fewer ( $P < 0.001$ ) lambs were reared through until weaning in 2003 and 2004 compared to 2005 (1.0, 1.1 and 1.27 respectively). Overall, Dorset X and Lleyn X primiparous ewes reared significantly ( $P < 0.001$ ) more lambs (1.24 and 1.21 respectively) through to weaning than Texel X (1.07) and Welsh Mountain (1.02) ewes. Cheviot X reared a similar number of lambs (1.08) to all other crossbred types and the Welsh Mountain ewes.

The predicted mean total weight of lamb at birth, eight weeks and weaning for each crossbred type in each year is given in Table 8, 9 and 10 respectively. Overall predicted mean total weight of lamb at birth, eight weeks and weaning for each crossbred type is depicted in Figure 6.

**Figure 6: Overall predicted mean total weight of lamb at birth, eight weeks and weaning for each crossbred type**



**Table 8: Predicted mean total lamb birth weight (kg per ewe) for each crossbred type in each year**

	2003	2004	2005	SED	SIG	Overall (breeds)	SED	SIG
<b>Cheviot</b>	4.98 <sup>cde</sup>	4.74b <sup>cde</sup>	5.03 <sup>cde</sup>	0.29	***	4.92 <sup>a</sup>	0.17	***
<b>Dorset</b>	5.16 <sup>de</sup>	4.72b <sup>cde</sup>	4.87 <sup>bcde</sup>			4.92 <sup>a</sup>		
<b>Lleyn</b>	4.64b <sup>cd</sup>	4.47 <sup>bc</sup>	5.30 <sup>e</sup>			4.80 <sup>a</sup>		
<b>Texel</b>	4.87b <sup>cde</sup>	4.69 <sup>bcd</sup>	5.90 <sup>f</sup>			5.15 <sup>a</sup>		
<b>Welsh</b>	4.36 <sup>ab</sup>	3.85 <sup>a</sup>	3.87 <sup>a</sup>			4.03 <sup>b</sup>		
<b>Overall (years)</b>	4.80 <sup>a</sup>	4.50 <sup>b</sup>	4.99 <sup>a</sup>	0.13	***			

Overall primiparous Welsh Mountain ewes had significantly lighter ( $P < 0.001$ ) total lamb birth weights than the primiparous crossbred ewe types (4.03 vs. 4.92, 4.92, 4.80 and 5.15 kg for Welsh Mountain vs. Cheviot X, Dorset X, Lleyn X and Texel X respectively). Total lamb birth weights were significantly lower ( $P < 0.001$ ) in 2004 compared to 2003 and 2005 (4.50 kg compared to 4.80 and 4.99 kg respectively).

**Table 9: Predicted mean total lamb 8 week weight (kg per ewe) for each crossbred type in each year**

	2003	2004	2005	SED	SIG	Overall (breeds)	SED	SIG
<b>Cheviot</b>	22.2 <sup>ab</sup>	24.7 <sup>bcd</sup>	31.6 <sup>ef</sup>	2.03	**	26.2 <sup>ab</sup>	1.17	***
<b>Dorset</b>	23.2 <sup>bc</sup>	29.2 <sup>ef</sup>	27.2 <sup>cde</sup>			25.5 <sup>b</sup>		
<b>Lleyn</b>	21.6 <sup>ab</sup>	21.7 <sup>ab</sup>	28.6 <sup>def</sup>			24.0 <sup>a</sup>		
<b>Texel</b>	22.0 <sup>ab</sup>	24.8 <sup>bcd</sup>	32.4 <sup>f</sup>			26.4 <sup>b</sup>		
<b>Welsh</b>	18.3 <sup>a</sup>	18.8 <sup>a</sup>	22.0 <sup>ab</sup>			19.7 <sup>c</sup>		
<b>Overall (years)</b>	21.5 <sup>a</sup>	23.8 <sup>b</sup>	28.4 <sup>c</sup>	0.91	***			

**Table 10: Predicted mean total lamb weaning weight (kg per ewe) for each crossbred type in each year**

	2003	2004	2005	SED	SIG	Overall (breeds)	SED	SIG
<b>Cheviot</b>	32.9 <sup>abc</sup>	36.6 <sup>bcde</sup>	42.7 <sup>fg</sup>	2.69	**	37.4a	1.55	***
<b>Dorset</b>	35.9 <sup>bcd</sup>	40.6 <sup>defg</sup>	37.4 <sup>cdef</sup>			38.0a		
<b>Lleyn</b>	33.1 <sup>abc</sup>	34.2 <sup>abc</sup>	41.8 <sup>efg</sup>			36.4a		
<b>Texel</b>	32.0 <sup>ab</sup>	36.7 <sup>bcde</sup>	43.6 <sup>g</sup>			37.4a		
<b>Welsh</b>	29.4 <sup>a</sup>	29.0 <sup>a</sup>	31.6 <sup>ab</sup>			30.0b		
<b>Overall (years)</b>	32.7 <sup>a</sup>	35.4 <sup>b</sup>	39.4 <sup>c</sup>	1.2	***			

The predicted mean total lamb weight at 8 weeks was significantly lighter ( $P < 0.001$ ) for Welsh Mountain (19.7 kg) compared to the other crossbred types. The total lamb 8 week weights for Cheviot X (26.2 kg) and Lleyn X (24.0 kg) were not significantly different to each other but total 8 week lamb weight for Lleyn X ewes was significantly lighter ( $P < 0.001$ ) than Dorset X (26.5 kg) and Texel X (26.4 kg). Overall total lamb 8 weeks weights were significantly greater ( $P < 0.001$ ) in 2005 (28.4 kg) compared to 2004 (23.8 kg) which was also significantly greater ( $P < 0.001$ ) than 2003 (21.5 kg).

The predicted mean total lamb weaning weight was significantly lighter ( $P < 0.001$ ) for Welsh Mountain ewes (30.0 kg) compared to the crossbred types. However the predicted mean total lamb weaning weight was similar

across the crossbred types (37.4, 38.0, 36.4 and 37.4 kg for the Cheviot X, Dorset X, Lleyn X and Texel X respectively). Overall the predicted mean total lamb weaning weight was significantly less ( $P < 0.001$ ) in 2003 (32.7 kg) compared to 2004 (35.4 kg) which in turn was significantly less ( $P < 0.001$ ) than 2005 (39.4 kg).

The liveweight and body condition score of the primiparous ewes at weaning in each year is given in Tables 11 and 12 respectively. Overall weaning weights and body condition scores of the primiparous ewes is depicted in Figures 7 and 8 respectively.

**Table 11: Predicted mean liveweight (kg) of primiparous crossbred ewes at weaning in three consecutive years**

	2003	2004	2005	SED	SIG	Overall (breeds)	SED	SIG
<b>Cheviot</b>	47.2 <sup>efg</sup>	44.0 <sup>cd</sup>	49.6 <sup>gh</sup>	1.28	***	47.0 <sup>a</sup>	0.74	***
<b>Dorset</b>	46.9 <sup>ef</sup>	46.1 <sup>cdef</sup>	49.8 <sup>h</sup>			47.6 <sup>a</sup>		
<b>Lleyn</b>	39.3 <sup>ab</sup>	43.6 <sup>c</sup>	46.4 <sup>def</sup>			43.1 <sup>b</sup>		
<b>Texel</b>	45.4 <sup>cde</sup>	48.4 <sup>fgh</sup>	50.6 <sup>h</sup>			48.1 <sup>a</sup>		
<b>Welsh</b>	38.7 <sup>ab</sup>	37.2 <sup>a</sup>	40.3 <sup>b</sup>			38.7 <sup>c</sup>		
<b>Overall (years)</b>	43.5 <sup>a</sup>	43.9 <sup>a</sup>	47.3 <sup>b</sup>	0.57	***			

**Figure 6: Overall predicted mean liveweight of primiparous crossbred ewes at weaning**

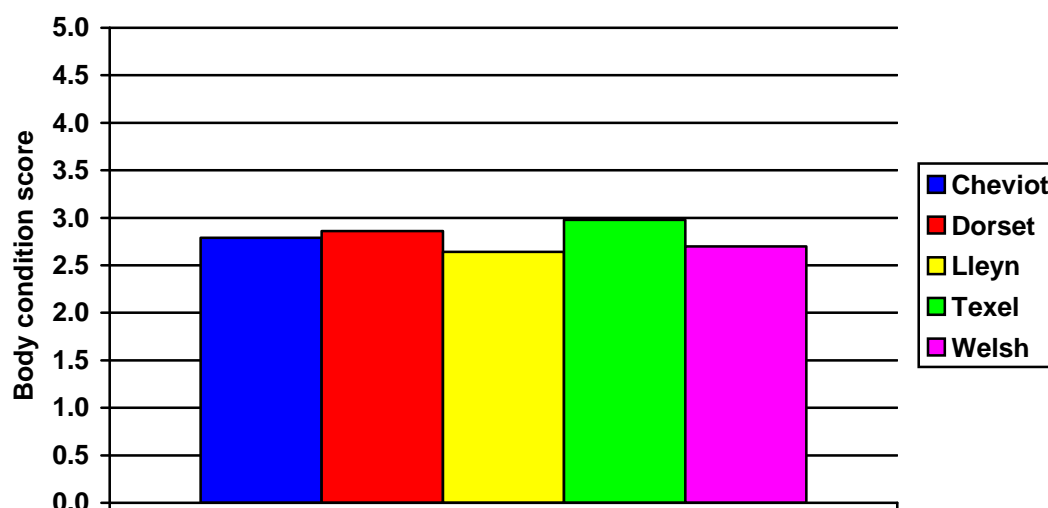


Overall, primiparous Welsh Mountain ewes were significantly lighter ( $P < 0.001$ ) at weaning than Lleyn X ewes (38.7 and 43.1 kg respectively) which were significantly lighter ( $P < 0.001$ ) than the other crossbred types. Cheviot X (47.0 kg), Dorset X (47.6 kg) and Texel X (48.1 kg) were similar in weight at weaning.

**Table 12: Predicted mean body condition score of primiparous crossbred ewes at weaning in three consecutive years**

	2003	2004	2005	SED	SIG	Overall (breeds)	SED	SIG
<b>Cheviot</b>	3.02	2.85	2.50	0.12	NS	2.79ab	0.07	***
<b>Dorset</b>	2.99	2.86	2.74			2.86bc		
<b>Lleyn</b>	2.59	2.78	2.54			2.64a		
<b>Texel</b>	3.04	3.01	2.89			2.98c		
<b>Welsh</b>	2.84	2.71	2.56			2.70a		
<b>Overall (years)</b>	2.89a	2.84a	2.64b	0.06	***			

**Figure 8: Overall predicted mean body condition score at weaning of primiparous ewes**



Overall predicted mean body condition scores at weaning were significantly higher ( $P < 0.001$ ) for Dorset X (2.86) and Texel X (2.98) than for Lleyn X (2.64) and Welsh Mountain (2.70) ewes. Cheviot X ewes had body condition scores at weaning (2.79) similar to the Dorset X, Lleyn X and Welsh Mountain

but significantly lower ( $P < 0.001$ ) than the Texel X. Overall weaning condition scores were significantly higher ( $P < 0.001$ ) in 2003 (2.89) and 2004 (2.84) than 2005 (2.64).

Numbers of adult ewes from selection through to second tupping are given in Table 13 below. Losses between selection and return from away-wintering were greatest for the Cheviot X (8%), however losses between return from away-wintering to shearing were greatest for the Texel X (9%). There were minimal losses of hoggets between shearing and 1<sup>st</sup> tupping (0.55% average across breeds). Losses of hoggets between selection and 1<sup>st</sup> tupping were greatest for Texel X ewes (14%) and least for Lleyn X ewes (3%). Cheviot X and Dorset X had losses of 11% between selection and 1<sup>st</sup> tupping and losses for Welsh Mountain were 8%. Losses of adult ewes between 1<sup>st</sup> and 2<sup>nd</sup> tupping were least for the Cheviot X (7.4%) and highest for the Welsh Mountain ewe (16.1%). Of the other crossbred ewe types losses were greatest for the Dorset X (14.1%) and similar for the Lleyn X (13.1%) and the Texel X (13.9%).

**Table 13: Number of adult ewes from selection through to second tupping**

	<b>Cheviot</b>	<b>Dorset</b>	<b>Lleyn</b>	<b>Texel</b>	<b>Welsh</b>
<b>Selection</b>	150	150	150	150	138
<b>Away-wintering</b>	138	147	145	144	
<b>Shearing</b>	131	136	145	131	
<b>1<sup>st</sup> Tupping</b>	135	135	145	129	126
<b>2<sup>nd</sup> Tupping</b>	125	116	126	111	105

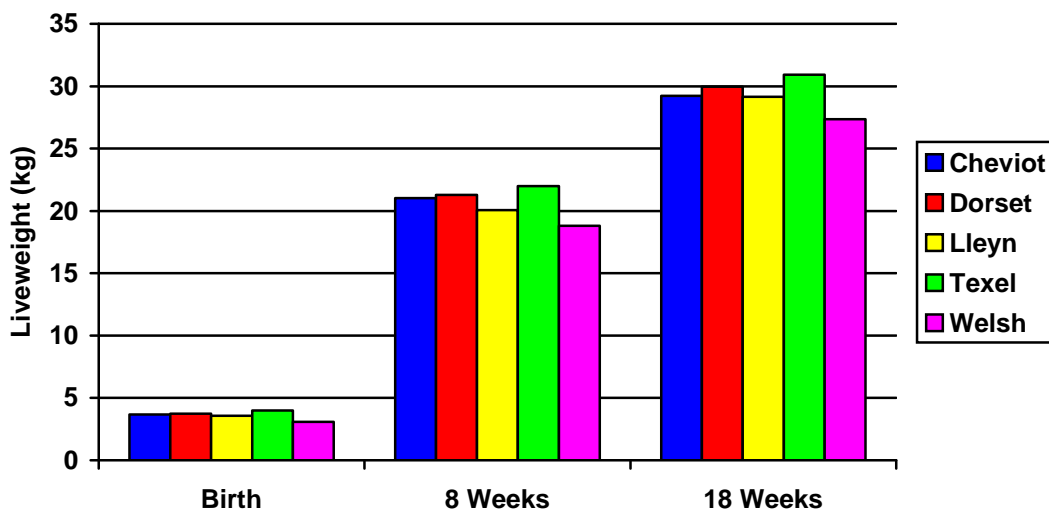
### Physical performance of lambs

The average liveweight of lambs at birth, eight weeks and 18 weeks of age are given in Table 14 and depicted graphically in Figure 9. Lambs from older ewes (3 and 4 year old) tended to be heavier at birth, eight weeks and eighteen weeks of age compared to 2 year old ewes.

**Table 14: Predicted mean liveweight (kg) of lambs at birth, eight weeks and 18 weeks of age**

	Cheviot	Dorset	Lleyn	Texel	Welsh	SED	SIG
<b>Birth</b>	3.67 <sup>a</sup>	3.74 <sup>a</sup>	3.57 <sup>b</sup>	4.01 <sup>c</sup>	3.10 <sup>d</sup>	0.06	***
<b>8 weeks</b>	21.0 <sup>a</sup>	21.3 <sup>ab</sup>	20.1 <sup>c</sup>	22.0 <sup>b</sup>	18.8 <sup>d</sup>	0.41	***
<b>18 weeks</b>	29.2 <sup>a</sup>	30.0 <sup>a</sup>	29.1 <sup>a</sup>	30.9 <sup>b</sup>	27.3 <sup>c</sup>	0.48	***

**Figure 9: Predicted mean liveweight of lambs at birth, eight weeks and 18 weeks of age**



Lambs born to Texel X ewes significantly heavier ( $P < 0.001$ ) at birth (4.01kg) compared to lambs born to Welsh ewes (3.10 kg). Birth weights for lambs born to Cheviot X (3.67 kg) and Dorset X ewes (3.74 kg) were similar and significantly heavier than lambs born to Lleyn X ewes (3.57 kg). Lambs born to Welsh ewes were significantly lighter than those born to crossbred ewe types. At eight weeks of age lambs from Texel X ewes (22.0 kg) were significantly heavier than those from Welsh ewes (18.8kg), Cheviot X (21.0

kg), Dorset X (21.3 kg) and Lleyn X (20.1 kg) ewes. Eight week weights were similar for lambs from Cheviot X and Dorset X ewes and similar for lambs from Dorset X and Texel X ewes. This trend in liveweight was also noted at 18 weeks of age (weaning) with lambs from Texel X ewes being significantly heavier (30.9 kg) and lambs from Welsh Mountain ewes being significantly lighter (27.3 kg) than the other crossbred ewe types. Weaning weights of lambs from Cheviot X (29.2 kg), Dorset X (30.0 kg) and Lleyn X (29.1 kg) were similar.

The average daily liveweight gains (DLG) of the lambs are given in Table 15. DLG from birth to eight weeks was similar for lambs born to Cheviot X, Dorset X and Lleyn X (0.27 kg) ewes, with lambs from Texel X ewes having significantly higher DLG (0.29 kg) and lambs from Welsh Mountain ewes having significantly lower DLG (0.25). DLG from birth to 18 weeks of age was similar for lambs from Cheviot X and Welsh Mountain ewes (0.19 kg) which was significantly lower than DLG for lambs from Texel ewe (0.21 kg). DLG from birth to 18 weeks was similar for lambs from Dorset X and Lleyn X ewes (0.20) which was not significantly different to that of lambs from Texel X ewes or Cheviot X and Welsh Mountain ewes.

**Table15: Predicted mean daily liveweight gain (kg) of terminal lambs**

	<b>Cheviot</b>	<b>Dorset</b>	<b>Lleyn</b>	<b>Texel</b>	<b>Welsh</b>	<b>SED</b>	<b>SIG</b>
<b>Birth – 8 weeks</b>	0.27 <sup>a</sup>	0.27 <sup>a</sup>	0.27 <sup>a</sup>	0.29 <sup>b</sup>	0.25 <sup>c</sup>	0.005	***
<b>Birth – 18 weeks</b>	0.19 <sup>ab</sup>	0.20 <sup>bc</sup>	0.20 <sup>bc</sup>	0.21 <sup>c</sup>	0.19 <sup>ab</sup>	0.004	***

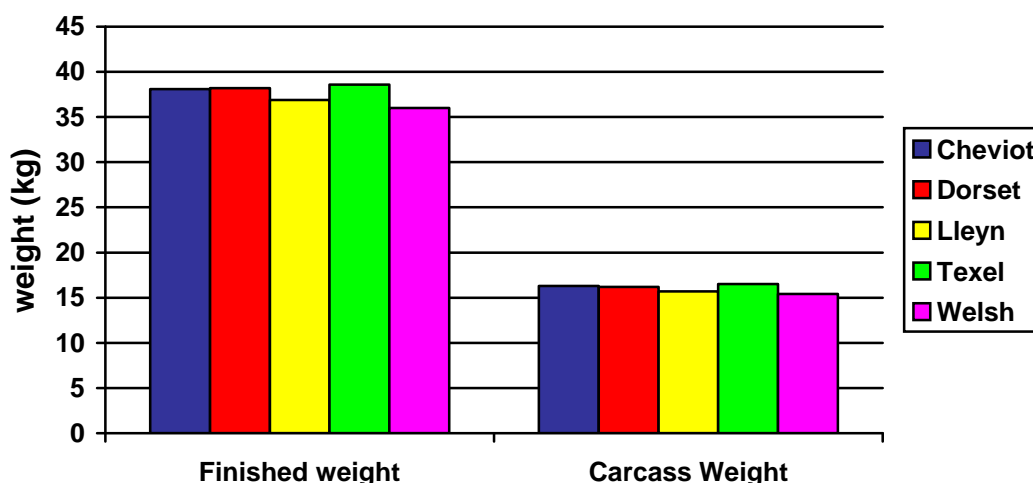
All lambs were finished and went for slaughter. Over the three years 1,252 lambs went for slaughter of which 645 were females and 607 were males. 200 lambs were from Cheviot X ewes, 276 from Dorset X ewes, 329 from Lleyn X ewes, 245 from Texel X ewes and 202 from Welsh Mountain ewes. The average finished lamb performance details are given in Table 16. The average finished weight and carcass weight is depicted graphically in Figure 10. Lambs from Welsh Mountain ewes and Cheviot X ewes had a predicted mean age at finishing of 30.7 and 30.1 weeks respectively. Lambs from

Dorset X and Lleyn X ewes were finished at a predicted mean of 29.7 and 29.5 weeks of age with lambs from Texel X ewes being finished at a predicted mean of 28.5 weeks of age.

**Table 16: Predicted mean finished lamb performance**

	Cheviot	Dorset	Lleyn	Texel	Welsh	SED	SIG
<b>Age at finishing (weeks)</b>	30.1 <sup>ab</sup>	29.7 <sup>abc</sup>	29.5 <sup>ac</sup>	28.5 <sup>c</sup>	30.7 <sup>a</sup>	0.56	***
<b>Finished weight (kg)</b>	38.1a	38.2a	36.9b	38.6a	36.0b	0.41	***
<b>Carcass weight (kg)</b>	16.3a	16.2a	15.7b	16.5a	15.4b	0.23	***
<b>Killing out proportion (%)</b>	43.0	42.5	43.0	42.4	43.1	0.44	NS
<b>Muscle depth (mm)</b>	24.9	25.3	24.7	25.0	24.7	0.26	NS
<b>Fat depth (mm)</b>	2.90	2.94	2.93	2.96	3.02	0.07	NS

**Figure 10: Predicted mean finished weights and carcass weights of finished lambs**



Lambs from Welsh Mountain (36.0 kg) and Lleyn X (36.9 kg) ewes were significantly lighter ( $P < 0.001$ ) at finishing (36.0 kg) compared to lambs from Cheviot X (38.1 kg), Dorset X (38.2 kg) and Texel X ewes (38.6 kg) which

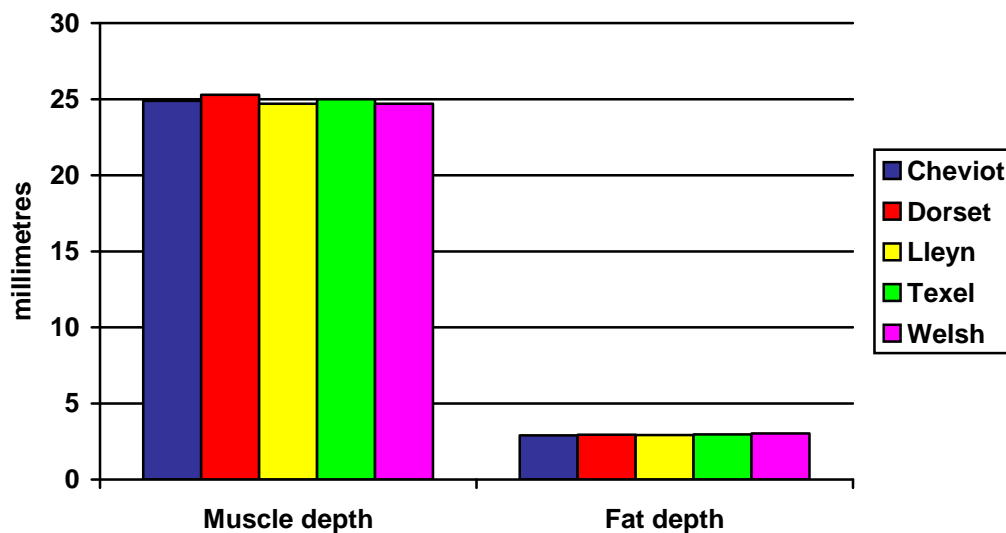
were similar in weight. Lambs from Lleyn X ewes were significantly lighter than lambs from the other crossbred ewes ( $P < 0.001$ ).

Killing out percentages were similar between the different crossbred types and pure bred Welsh Mountain ewes and average 42.7%. Lambs from Welsh Mountain ewes had the highest killing out percentage (43.1%) whereas lambs from Texel X ewes had the lowest killing out percentage (42.4%). Carcass weights were similar for lambs from Cheviot X, Dorset X and Texel X ewes (16.3, 16.2 and 16.5 kg respectively) and similar for lambs from Lleyn X and Welsh Mountain ewes (15.7 and 15.4 kg respectively).

Prior to slaughter, finished lambs were ultrasonically scanned to measure eye muscle depth and fat cover at the third lumbar vertebra. The average muscle and fat depth are given in Table 16 and depicted graphically in Figure 11.

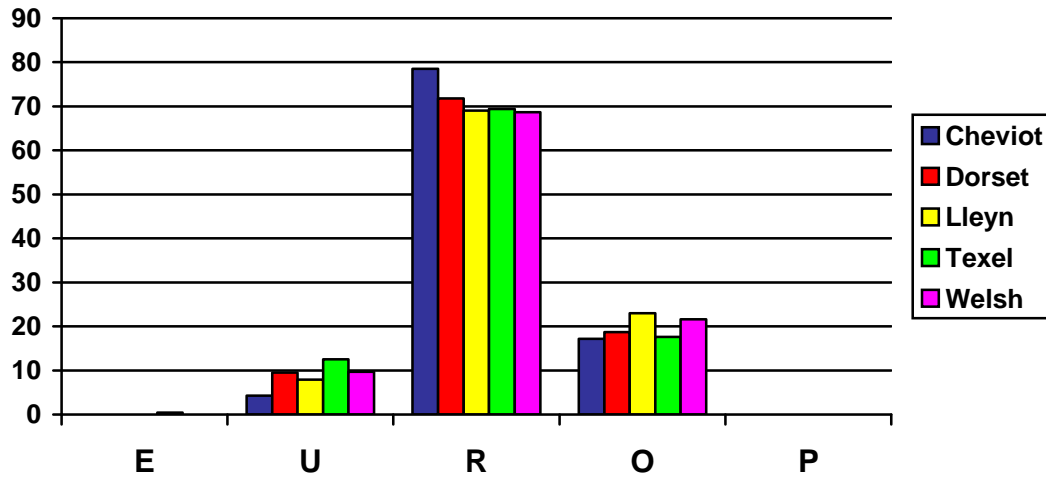
Average muscle depths were similar for lambs from the different dam crosses (24.9, 25.3, 24.7, 25.0 and 24.7 mm for Cheviot X, Dorset X, Lleyn X, Texel X and Welsh Mountain respectively). Average fat depth was also similar across the different dam crosses.

**Figure 11: Predicted mean muscle depth and fat depth of finished lambs**



Lambs were selected as finished at a fat class of 2/3L. The percentage of finished lambs in each of the EUROP conformation classes is shown in Figure 12 below.

**Figure 12 Percentage of finished lambs carcasses in each EUROP conformation class**



On average 80% of lambs were classed as R grade or better, however there were some differences between lambs from different dam crosses. 77% of lambs from the Lleyn X ewes graded R or better, 78% of lambs from Welsh Mountain ewes, 81% of lambs from Dorset X ewes, 82% of lambs from Texel X ewes and 83% of lambs from Cheviot X ewes.



## Discussion

The performance of the ewe lambs from birth until tuppung followed a consistent pattern, with Dorset X being heaviest, Texel X next heaviest, Cheviot X second lightest and Lleyn X the lightest of the crossbreds. The only exception was five week weights where Texel X were heavier than Dorset X ewe lambs. Eye muscle depth as measured ultrasonically was greatest for the Texel X, then Dorset X, then the Cheviot X with the Lleyn X having the smallest eye muscle depth. The fat depth also measured ultrasonically was greatest for the Dorset X, then the Texel X, the Lleyn X with the Cheviot X having the least fat depth.

Dorset X ewe lambs produced heavier fleeces of a higher grade compared to the other crossbreds and compared to pure bred Welsh Mountain. This increase in fleece weight and quality resulted in a trebling of value of the fleeces compared to Welsh Mountain fleeces. The value of the fleeces of the crossbred types was at least double that of a Welsh Mountain fleece. This increase in value more than covered the costs of shearing. The increase in value will have a substantial impact on the overall profitability of the crossbred flock.

Current benchmarking indicators used by the FBS are litter size per ewe, number of lambs reared per ewe and total lamb weight weaned per ewe. Using these indicators for the primiparous ewes, the Lleyn X had the greatest litter size (1.46 lambs per ewe) whereas the Dorset X reared the greatest number of lambs (1.24 per ewe). Losses between birth (litter size) and weaning (number reared) were least for the pure bred Welsh Mountain ewe (0.16 lambs). For the crossbred ewes, losses between birth and weaning were least for the Dorset X (0.18) and greatest for the Lleyn X (0.25) over the three cohorts. However, there was significant year to year variation. In 2003, there were large lamb losses in the first cohort of crossbred ewes, particularly for the Cheviot X (0.36) and Texel X (0.28). This was mainly due to oversized single lambs being birthed outdoors largely unsupervised. The lamb losses were considered unacceptable and for the next two cohorts of primiparous ewes, all were lambed indoors regardless of litter size. The need for close

supervision of primiparous crossbred ewes at lambing will be a significant factor to consider when selecting crossbred type.

Total kg of lamb weaned per ewe was significantly greater for all primiparous crossbred types compared to the Welsh Mountain. Dorset X ewes reared the greatest total kg of lamb weaned, however this was only 0.6 kg more than either the Cheviot X or the Texel X ewe. The Lleyn X ewe reared 1.0 kg less than the Cheviot X or Texel X ewes, however this was still on average 6.4 kg more than the Welsh Mountain ewe. The improvement in kg of lamb weaned per ewe should provide an improvement in the profitability of the enterprise.

Performance of individual terminal lambs produced to date were also monitored. A consistent pattern for liveweight when measured from birth through to finished condition, was seen with lambs produced from Texel X ewes ranking the heaviest through Dorset X, Cheviot X and Lleyn X and lambs produced from Welsh Mountain ewes the lightest.



## Conclusions

Using the results to date, the Dorset X ewe gave the greatest number of lambs reared, least losses from birth to weaning and subsequently the heaviest total kg lamb weaned and lamb finished compared to the other crossbred types. Dorset X ewes also reached slaughter earlier and gave highest returns for wool. Lleyn X ewes gave the highest litter size and Texel X ewes produced more E and U grade lambs. Losses of adult ewes between first and second tugging were least for the Cheviot X.

The results demonstrate that each crossbred type has different beneficial traits. The importance of these individual traits to an individual farm will be determined by enterprise type, management systems and business objectives.

The continued monitoring of the crossbred flock across three lamb crops for each of the three cohorts will enable ewe longevity and productivity to be assessed and a full financial appraisal of the respective breeds to be evaluated.



## Appendix 1

### *Crossbred ewes*

The results presented in this section are based on the results for all ewes that have lambed during 2003, 2004 and 2005. This includes 3 cohorts of 2 year old ewes, 2 cohorts of 3 year old ewes and 1 cohort of 4 year old ewes.

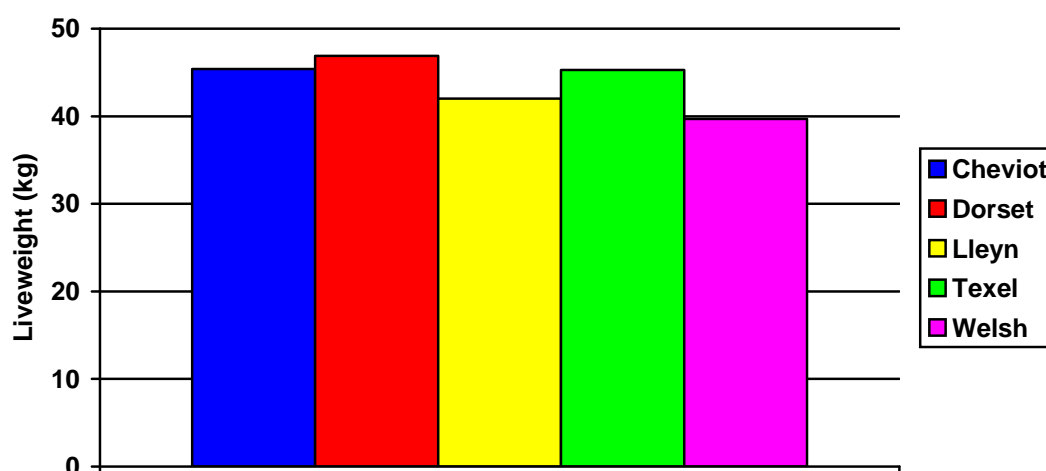
Monitoring of ewes across three lambs crops for all three cohorts is on-going and results will be available in late 2007.

The predicted mean tuppung weight and body condition score for all crossbred ewes are depicted graphically in Figure 1.1 and .2 respectively and given in Table 1.1 below.

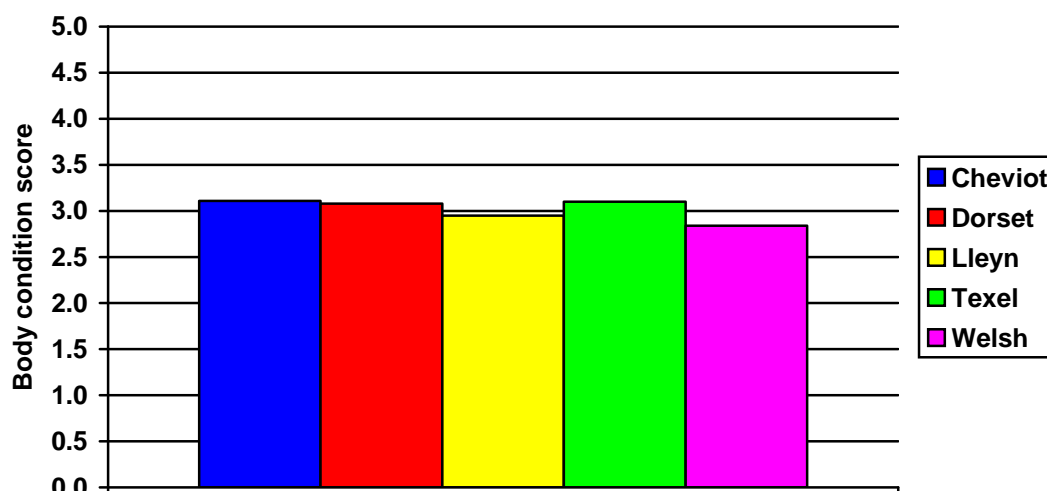
**Table 1.1: Predicted mean liveweight (kg) and body condition score of crossbred ewes at tuppung**

	Cheviot	Dorset	Lleyn	Texel	Welsh	SED	SIG
<b>Liveweight</b>	45.4 <sup>a</sup>	46.9 <sup>b</sup>	42.0 <sup>c</sup>	45.3 <sup>a</sup>	39.7 <sup>d</sup>	0.63	***
<b>Condition Score</b>	3.11 <sup>a</sup>	3.08 <sup>a</sup>	2.95 <sup>b</sup>	3.10 <sup>a</sup>	2.84 <sup>b</sup>	0.06	***

**Figure 1.1: Predicted mean tuppung weight for crossbred ewes**



**Figure 1.2: Predicted mean condition score at tuppung for crossbred ewes**



Pure bred Welsh Mountain ewes were significantly lighter ( $P < 0.001$ ) at tuppung (39.7 kg) than their crossbred counterparts. The Dorset X ewes were significantly heavier ( $P < 0.001$ ) at tuppung (46.9 kg) than the other crossbred types, whereas the Lleyn X ewes were significantly lighter ( $P < 0.001$ ) at tuppung (42.0 kg). The Cheviot X (45.4 kg) and the Texel X (45.3) had similar liveweights at tuppung. The Welsh Mountain and the Lleyn X had similar body condition scores at tuppung (2.84 and 2.95 respectively) which were significantly less ( $P < 0.001$ ) than the Cheviot X (3.11), Dorset (3.08) and Texel X (3.10) which were similar.

The predicted mean litter size and number of lambs reared through to weaning are given in Table 1.2. Litter size was significantly greater ( $P < 0.001$ ) for the Dorset X (1.59) and the Lleyn X (1.59) compared to the Cheviot X (1.43), the Texel X (1.43) and the Welsh Mountain (1.43).

**Table 1.2: Predicted mean litter size and number of lambs reared through to weaning for crossbred ewes**

	Cheviot	Dorset	Lleyn	Texel	Welsh	SED	SIG
<b>Litter</b>	1.43 <sup>a</sup>	1.59 <sup>b</sup>	1.59 <sup>b</sup>	1.43 <sup>a</sup>	1.43 <sup>a</sup>	0.06	***
<b>Reared</b>	1.21 <sup>a</sup>	1.43 <sup>b</sup>	1.40 <sup>b</sup>	1.25 <sup>a</sup>	1.32 <sup>ab</sup>	0.07	***

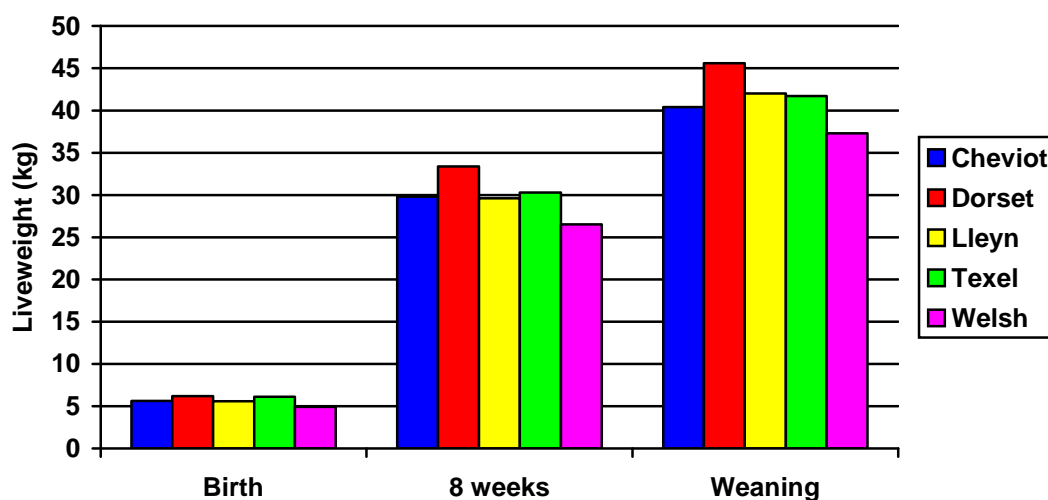
Predicted mean number of lambs reared through the weaning were significantly greater ( $P<0.001$ ) for Dorset X (1.43) and Lleyn (1.40) compared to the Cheviot X (1.21) and the Texel X (1.25). The pure bred Welsh Mountain reared a similar number of lambs (1.32) to their crossbred counterparts.

The predicted mean total lamb weight at birth, 8 weeks and weaning for ewes are given in Table 1.3 and depicted graphically in Figure 1.3.

**Table 1.3: Predicted mean total lamb weight (kg) at birth, 8 weeks and weaning for ewes**

	Cheviot	Dorset	Lleyn	Texel	Welsh	SED	SIG
<b>Birth</b>	5.64 <sup>a</sup>	6.19 <sup>b</sup>	5.60 <sup>a</sup>	6.11 <sup>b</sup>	4.93 <sup>c</sup>	0.17	***
<b>8 weeks</b>	29.8 <sup>a</sup>	33.4 <sup>b</sup>	29.6 <sup>a</sup>	30.3 <sup>a</sup>	26.5 <sup>c</sup>	1.20	***
<b>Weaning</b>	40.4 <sup>ab</sup>	45.6 <sup>c</sup>	42.0 <sup>b</sup>	41.7 <sup>b</sup>	37.3 <sup>a</sup>	1.52	***

**Figure 1.3: Predicted mean total lamb weight at birth, 8 weeks and weaning for ewes**



Predicted mean total lamb birth weight was significantly heavier ( $P<0.001$ ) for Dorset X (6.19 kg) and Texel X (6.11 kg) compared to the Cheviot X (5.64 kg) and the Lleyn X (5.6 kg) ewes. The total lamb birth weight for Welsh Mountain ewes (4.93 kg) was significantly lighter ( $P<0.001$ ) than their crossbred counterparts. Predicted mean total lamb 8 week weights were significantly greater ( $P<0.001$ ) for Dorset X ewes (33.4 kg) compared to the other crossbred types (29.8, 29.6 and 30.3 kg for Cheviot X, Lleyn X and

Texel X respectively). Total lamb 8 week weight were significantly lighter ( $P<0.001$ ) for Welsh Mountain ewes (26.5 kg) compared to the crossbred types. Predicted mean total lamb weaning weights were significantly lighter for Welsh Mountain ewes (37.3 kg) compared to the Lleyn X (42.0 kg) and Texel X ewes (41.7 kg). Total lamb weaning weight was similar for Cheviot X (40.4 kg), Lleyn X, Texel X and Welsh Mountain ewes. The predicted mean total lamb weaning weight was significantly greater ( $P<0.001$ ) for Dorset X ewes (45.6 kg) compared to the other crossbreds and the Welsh Mountain ewes.

The predicted mean lamb age at finishing and total lamb finished weights for crossbred ewes are given in Table 1.4. Lambs from Dorset X and Texel X ewes were finished at a significantly earlier ( $P<0.05$ ) age than those from Welsh Mountain ewes (29.4 weeks (both Dorset X and Texel X) vs. 30.8 weeks (Welsh Mountain) respectively). Lambs from Cheviot X (29.8 weeks) and Lleyn X (30.3 weeks) were finished at a similar age to lambs from Dorset X, Texel X and Welsh Mountain ewes.

**Table 16: Predicted mean lamb age (weeks) and total liveweight (kg per ewe) at finishing of lambs from crossbred ewes**

	<b>Cheviot</b>	<b>Dorset</b>	<b>Lleyn</b>	<b>Texel</b>	<b>Welsh</b>	<b>SED</b>	<b>SIG</b>
<b>Age</b>	29.8 <sup>ab</sup>	29.4 <sup>a</sup>	30.3 <sup>ab</sup>	29.4 <sup>a</sup>	30.8 <sup>b</sup>	0.75	*
<b>Weight</b>	50.6 <sup>ab</sup>	57.2 <sup>c</sup>	53.3 <sup>bc</sup>	52.1 <sup>b</sup>	47.1 <sup>a</sup>	2.24	***

Total finished lamb liveweight was significantly heavier ( $P<0.001$ ) for Dorset X (57.2 kg) compared to Cheviot X (50.6 kg) and Texel X (52.1 kg) ewes. Total finished lamb liveweight for Welsh Mountain ewes (47.1 kg) was significantly lighter ( $P<0.001$ ) compared to Dorset X, Lleyn X and Texel X ewes. Total finished lamb liveweight for Lleyn X ewes (53.3 kg) was similar to Dorset X, Cheviot X and Texel X ewes. Cheviot X ewes were similar in total lamb finished weight to Welsh Mountain ewes.

When benchmarking indicators are considered for both primiparous and multiparous ewes to date, similar trends are seen. Dorset X and Lleyn X ewes have the largest litter size (1.59 lambs per ewe) and also rear the greatest number of lambs (1.43 and 1.40 lambs per ewe respectively). Lamb

losses were least for the Welsh mountain ewe (0.11 lambs) and greatest for the Cheviot X (0.22 lambs).

Total kg of lamb weaned was greatest for the Dorset X (45.6 kg) ewe followed by the Lleyn X (42.0 kg) ewe and is probably a reflection of the larger number of lambs reared per ewe. The Cheviot X ewe reared 40.4 kg of lamb per ewe which was only 1.0 kg less than the Texel X ewe (41.7 kg) however this was on average 3.1 kg more than the Welsh Mountain ewe. The same trend was also apparent for total kg of lamb finished per ewe. Total kg of finished lamb per ewe was least for the Welsh Mountain (47.1 kg) and was similar to total kg for Cheviot X ewe (50.6 kg). Total kg of finished lamb was 10.1 kg more for the Dorset X (57.2 kg) compared to the Welsh Mountain. Lambs were on average finished 1.3 weeks earlier for the Dorset X ewe compared to the Welsh mountain. The earlier finishing coupled with the increase in kg of lamb finished should impact on the overall profitability of the enterprise.