

Cross breeding Welsh Mountain ewes



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June 2009

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HCC acknowledges the assistance of ADAS in compiling this booklet
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Introduction

The physical performance of a flock is crucial to its profitability. Physical performance is a combination of matching the right genotype to the farm resources. Achieving the ideal balance between production and survival traits is a principle aim for breeders, but the work is never finished because market specifications, availability of genetics and scientific understanding change over time. Profit drivers on sheep farms are kg sold per ewe, lamb weight and the price achieved. Utilising cross breeding can help to improve these factors in Welsh Mountain flocks.



Cross breeding

Cross breeding is a simple and easy way to change the characteristics of the ewes or lambs in your flock by taking advantage of hybrid vigour. Combining different breeds allows you to get the benefits of performance traits that cannot be found in one breed alone. The hardiness of mountain ewes can be combined with the improved carcass qualities of a terminal sire breed. Success comes when the crossbreds produced thrive in a given farm environment and produce carcasses of value to today's market.



Hybrid vigour

Hybrid vigour is the degree to which the crossbred progeny of a particular mating are better than their two parent breeds. While hybrid vigour can be used to enhance traits such as growth it has a far greater impact on traits of low heritability - such as fertility, milk yield and longevity. These traits are difficult to enhance through pure breeding but are greatly enhanced through crossbreeding – leading to improvements in lamb survival, reproductive efficiency and lamb growth rates.

There are two ways in which crossbreeding could be used to benefit mountain ewe productivity:

- First a terminal sire breed could be used on mountain ewes to produce a slaughter crop with improved carcase traits.
- Secondly the daughter from that cross could be used as a ewe replacement that is then bred to a terminal sire breed.

This booklet looks at both of these elements in turn and is based on some experimental work that took place at ADAS Pwllpeiran in Mid Wales, using 1,800 Welsh Mountain ewes mated to four different breeds. A full report can be found at www.hccmpw.org.uk.

Traits that are important in upland production

Traits of the ewe	Traits of the lamb
Early maturity Fertility Lambing ease Maternal behaviour (lamb survival) Milkiness Mature size (ewe efficiency) Ewe longevity Carcase value as cull Temperament Hardiness Disease resistance (e.g. footrot, intestinal parasite, scrapie) Dagginess	Birth weight (ease of lambing) Lamb vigour Lamb survival Growth rate Carcase conformation Fat class

Welsh Mountain ewes have historically been bred with hardiness, mothering and longevity as priorities. The downside has been lambs that are too small (average 15kg), have poor conformation (typically O) and low lambing % (typically 110-120%). By crossing with another more productive breed additional qualities can be utilised that could make your flock more productive.

Planning a new breeding strategy

You may be unhappy with your current ewe performance but before deciding what to change, reviewing the current flock performance may help highlight problem areas as well as areas of strength. Things to consider include:

- Size of flock and available staffing
- Current and target lambing %
- Target markets for slaughter and breeding stock
- Climatic and environmental factors that influence flock management and feed availability

Taking these factors into account a plan can be developed which considers;

- Which traits should be enhanced within the flock
- Which breeds can be used to create the ideal cross

Which breeds to cross with?

Different breeds bring different attributes to a cross. Four possible crossing sires were tested but others may be effective.

Cheviot	a larger hill breed than the Welsh that can increase size and retain hardiness
Dorset	an early maturing breed that can increase size, prolificacy and wool characteristics
Lleyn	to increase prolificacy and size
Texel	to improve size and conformation

Performance of crossbred lambs out of Welsh ewes

Over a three year period 1800 matings with pure Welsh Mountain ewes were achieved during the project at Pwllpeiran and some of the data are shown below to illustrate the performance of the different breeds. During the same period performance data from pure bred Welsh Mountain lambs was also collected to provide a comparison.

Over 90% of all births in the project required no assistance at lambing. Lambing difficulties were largely associated with higher birth weights which meant that 15% of Texel X, 11% of Dorset X, 9.5% of Cheviot X and 8% of Lleyn X births were categorised as requiring some assistance at lambing.

The table below shows the weights of the four cross breeds at birth, 5 weeks, 10 weeks and 16 weeks of age.

Liveweight (kg) of crossbred lambs at birth, 5 weeks, 10 weeks and 16 weeks of age

	Cheviot X	Dorset X	Lleyn X	Texel X
Birth weight	3.5	3.6	3.4	3.6
5 week	13.9	14.6	13.5	14.8
10 week	21.5	22.6	20.8	22.8
16 week	26.5	27.9	26.1	28.1



During the project the average age at finishing was 24 weeks, 26 weeks, 27 weeks and 28 weeks for Texel X, Dorset X, Lleyn X and Cheviot X lambs respectively. The average age at finishing for pure bred Welsh Mountain lambs was 32 weeks.

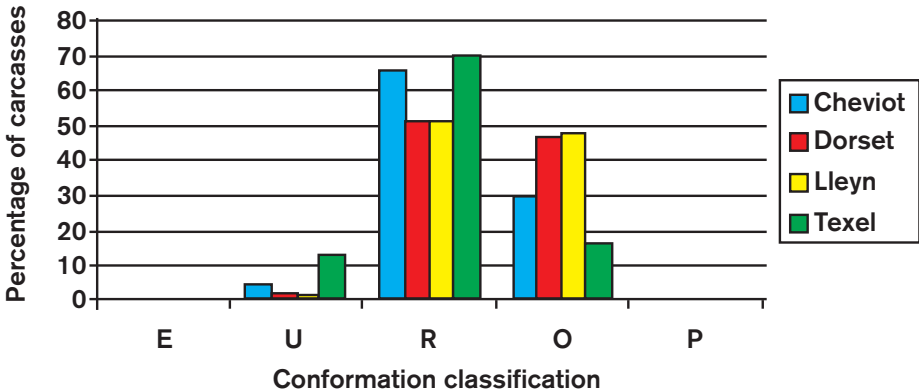
Texel X and Dorset X lambs were significantly heavier at finishing than Lleyn X lambs (39.5 kg and 39.4 kg vs. 37.8 kg respectively).

Slaughter attributes of crossbred lambs

	Cheviot X	Dorset X	Lleyn X	Texel X	Pure Welsh
Slaughter age (days)	195	182	192	170	223
Slaughter Wt (kg)	38.7	39.4	37.8	39.5	32.4
Muscle depth (mm)	25.6	25.2	25.0	26.6	19.4
Back Fat depth (mm)	2.78	2.87	2.78	2.74	2.60
Carcass weight (kg)	16.9	17.0	16.7	17.3	14.1
Killing out %	43.6	43.3	44.3	43.8	43.5

Lambs were selected for slaughter to attain a fat class of 2 to 3L. Texel X lambs had significantly better conformation scores on the EUROP classification than other crossbred lambs as shown in the graph below.

Percentage of crossbred lamb carcasses in each EUROP class



Financial performance of crossbred lambs

The financial performance of the crossbred lambs was calculated using standard costings from the Farm Business Survey 2006/07. A Texel X lamb was worth £8.36 more than a pure bred Welsh Mountain lamb (£32.72). The price differential between a Welsh Mountain and Dorset X, Cheviot X and Lley X was £8.26, £7.53 and £6.59 respectively. The price differential between the cross bred lambs was much less with the greatest differential (£1.77) between Texel X lambs and Lley X lambs.



Price comparison of finished crossbred lambs to finished pure bred Welsh Mountain lambs.

	Cheviot X	Dorset X	Lley X	Texel X	Welsh Mountain
Finished weight (kg)	38.7	39.4	37.8	39.5	32.4
Lamb price (£/kg)*	1.04	1.04	1.04	1.04	1.01
Lamb value (£)	40.25	40.98	39.31	41.08	32.72

* assumes a hill lamb classed at a light livestock weight for the Welsh Mountain lamb and assumes a upland lamb classed as a medium livestock weight for the crossbred lambs.

Gross margins (before forage costs) for Welsh Mountain ewes producing crossbred lambs compared to pure bred lambs (£ per ewe basis)

	Cheviot	Dorset	Lleyn	Texel	Welsh Mountain
Lambs reared	1.19	1.13	1.18	1.17	1.09
Lamb sales	£47.90	£46.31	£46.39	£48.22	£35.66
Other sheep sales	£9.12	£9.12	£9.12	£9.12	£9.12
Wool	£1.13	£1.13	£1.13	£1.13	£1.13
Less sheep purchases	£5.21	£5.21	£5.21	£5.21	£5.21
	£52.94	£51.35	£51.43	£53.26	£40.70
Variable Costs					
Feed	£10.47	£10.47	£10.47	£10.47	£10.19
Vet & Med	£2.88	£2.88	£2.88	£2.88	£2.55
Other costs	£4.10	£4.10	£4.10	£4.10	£3.33
	£17.45	£17.45	£17.45	£17.45	£16.07
Gross margin	£35.49	£33.90	£33.98	£35.81	£24.63

On average, the gross margin per ewe was increased by £10.16 for ewes producing crossbred lambs compared to ewes producing pure bred lambs mainly due to the higher carcase returns.



Performance of crossbred ewes

Lifetime breeding performance of crossbred ewes

The lifetime productivity of a ewe is the crucial factor in overall profitability. Good first year performance and a high cull rate may not be as cost effective as lower performance and greater ewe longevity. The results presented in this section are based on the average results for all ewes over their first three matings. Longevity was assessed for 5 matings.

Litter size was significantly greater for the Dorset X and the Lleyn X compared to the Cheviot X, the Texel X and the Welsh Mountain.

Slaughter attributes of crossbred lambs

	Cheviot X	Dorset X	Lleyn X	Texel X	Pure Welsh
Lambs born	1.53	1.62	1.65	1.46	1.40
Lambs weaned	1.33	1.43	1.49	1.25	1.22
Litter weight (kg/ewe)					
Birth	6.2	6.4	6.3	6.2	5.2
8 weeks	32.6	35.2	32.7	33.1	28.1
Weaning	43.5	46.5	46.1	44.2	37.1

All ewe lambs were mated at approximately 19 months of age to Suffolk rams.

Second and third season matings were also to Suffolk rams.

Litter size born or reared, and litter size performance are expressed per ewe lambing rather than per ewe mated.

This performance was achieved by grazing all ewes with single lambs on semi improved mountain pastures up to 2000 ft above sea level.

The number of lambs reared through to weaning were significantly greater for Dorset X and Lleyn X compared to the Texel X and the pure bred Welsh Mountain.

Mean litter birth weight was significantly heavier for crossbreds compared to pure bred Welsh Mountain ewes but there were no significant differences in litter birth weight for the different crossbreds. 8 week weights were significantly greater for Dorset X ewes compared to the other crossbred types. All crossbreds had significantly heavier litter weights at 8 weeks than pure Welsh and this was still evident at weaning when litters from Cheviot X, Dorset X, Lleyn X and Texel X ewes were 5.6, 9.4, 9.0 and 7.1kg heavier per ewe than from pure Welsh Mountain ewes.



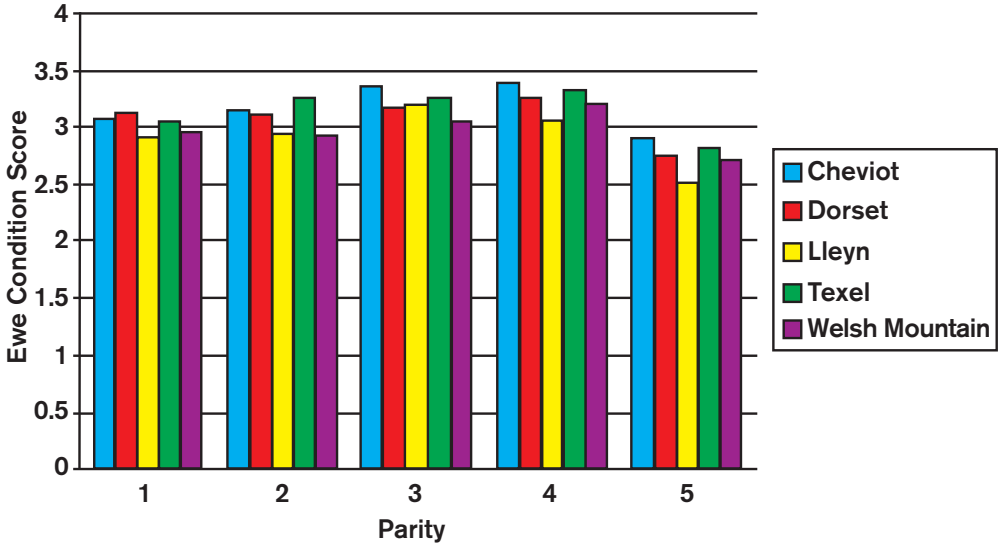
A Dorset x Welsh ewe

Ewe Longevity

Ewe longevity was recorded for 5 years. Culling policy was based on normal farm practice. Barren ewes were sold, as were animals with persistent lameness, animals that had suffered a vaginal prolapse or any udder problems. From their third lambing onwards, ewes were also inspected for teeth and broken mouths were rejected.

A measure of a ewe's ability to cope with hill conditions is her ability to successfully rear a lamb and maintain body weight and condition. In general, ewe body weight continued to increase up to the fourth parity whilst condition score which was targeted to average 3 at tupping was largely consistent across all ages with a noticeable decline in the fifth parity when age was beginning to show.

Ewe condition score at tupping (scale 1(LEAN)- 5(FAT))



Parity – the number of lamb crops produced by a ewe (e.g. parity 2 – the ewe has produced two lamb crops)



Physical performance of lambs from crossbred ewes

Lambs from Dorset X and Texel X ewes were finished up to 2 weeks earlier than those from Welsh Mountain ewes. Lambs from Cheviot X and Lleyn X finished about 1 week earlier.

Lamb performance at finishing from crossbred ewes

	Cheviot X	Dorset X	Lleyn X	Texel X	Pure Welsh
Age (days)	209	201	206	204	215
Weight (kg)	37.2	37.8	36.4	38.0	34.5
Carcass weight (kg)	16.3	16.2	15.7	16.5	15.4
Killing out %	43.0	42.5	43.0	42.4	43.1
Muscle depth (mm)	24.9	25.3	24.7	25.0	24.7
Fat depth (mm)	2.90	2.94	2.93	2.96	3.02

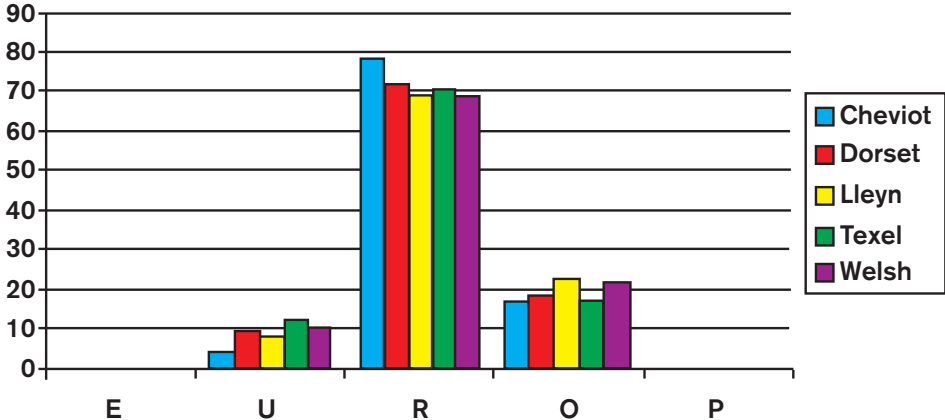
Finished lamb liveweight was significantly heavier for lambs from all crossbred ewes compared to pure Welsh Mountain ewes but lambs from Lleyn X ewes were lighter at finishing than Cheviot X, Dorset X or Texel X crossbred lambs.



Killing out percentages were similar between the different crossbred types and pure bred Welsh Mountain ewes (average 42.7%). Carcase 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).

On average, 80% of lambs were classed as R grade or better which would be expected for lambs sired by a Suffolk, 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.

Percentage of finished lamb's carcasses in each EUROP conformation class



Financial performance of crossbred ewes

Using crossbred ewes increased margins further. In this case all the lambs were Suffolk crosses and all crossbred ewes produced a higher gross margin than the pure Welsh Mountain. The most marked effects were where prolificacy was improved (Dorset and Lleyn) where gross margins were raised a further £8-9 per ewe. This resulted in increased margins of almost £20 per ewe between a Dorset X Welsh Mountain ewe put to a Suffolk ram, compared to a Welsh Mountain ewe bred pure. Whilst no effect on stocking rates were evaluated under this project, it is probable that stocking rates for crossbreds would need to be reduced. In addition, it is acknowledged that adverse weather conditions were not experienced in the years of the investigation and sufficient in-bye was available for grazing twins.

Gross margins (before forage costs) for Welsh Mountain and Welsh Mountain crossbred ewes producing Suffolk lambs from natural service (£ per ewe basis)

	Cheviot	Dorset	Lleyn	Texel	Welsh Mountain
Lambs reared	1.33	1.43	1.49	1.25	1.22
Lamb sales	£53.53	£58.60	£58.57	£51.51	£47.58
Other sheep sales	£10.43	£10.77	£9.65	£10.41	£9.12
Wool	£2.26	£3.39	£2.26	£2.26	£1.13
Less sheep purchases	£6.60	£6.83	£6.34	£7.02	£5.22
	£59.62	£65.94	£64.14	£57.16	£52.61
Variable Costs					
Feed	£12.92	£14.17	£13.39	£12.20	£10.47
Vet & Med	£3.11	£3.34	£3.48	£2.92	£2.85
Other costs	£4.10	£4.10	£4.10	£4.10	£4.10
	£20.12	£21.61	£20.97	£19.22	£17.42
Gross margin	£39.50	£44.33	£43.17	£37.94	£35.19

The results show that the Dorset X ewe gave the greatest gross margin return. Each breed-cross had some positive and some negative attributes. All crossbred ewes showed significant increases in performance over the pure Welsh Mountain ewe, producing more lambs and producing lambs with greater growth potential even when grazing mountain pastures.

The project has shown that the use of crossbred ewes on hill farms in Wales does offer production benefits that can increase farm productivity and produce a lamb better aligned to market requirements and in doing so improve margins. In order to maximise the use of crossbreeding first decide which traits you would like to improve and then look at which breeds can bring these traits to your flock.



Case Study

Dylan Huws, Bryncelynog, Cwm Prysor, Trawsfynydd

Dylan farms approximately 700 acres with his wife and has 480 ewes and 28 pedigree Limousin cattle. Historically, Dylan kept pure Welsh Mountain ewes and mated them to a Welsh Mountain ram.

In 2006 Dylan became one of the Hybu Cig Cymru Demonstration Farms managed as part of the Farming Connect programme and the opportunity was taken to review the business at Bryncelynog. This highlighted that the sheep enterprise had room for improvement and in particular the output of kg per ewe was 34kg compared to the Farm Business Survey figure of 51kg for an average hill and upland farm.

In order to improve the situation Dylan decided to use a Texel ram with the intention of increasing the size and growth potential of the lambs. In the first year the ewes mated to a Texel produced lambs that were on average 2.5 kg heavier than those mated to a pure Welsh ram. In the second year a Texel ram was used on 50 ewes and a Cheviot ram was put to 100 ewes. This resulted in lambs that were on average 4.5kg heavier. This additional weight gain was achieved by using a proportion of crossbred ewes.



Lamb type	Number of lambs	Av. weight	Av price £/head	Difference/head
Pure Welsh	218	28.42	29.38	
Cross bred	99	33.25	42.19	£12.81

Dylan's intentions now are to increase the number of Welsh ewes put to the Cheviot ram and also to keep some of the Cheviot X ewe lambs. This should provide even greater potential to increase kg/ewe output particularly if these cross breeds are mated back to a Cheviot ram.