AgriSearch NI
Farmer Funded Research

SHEEP EVENT SPECIAL

Welcome to a special edition of AgriSearch's electronic newsletter which has been released for the National Sheep Association's Sheep Event at Ballymena Livestock Market on Monday 1st July.

LMC

We are very pleased to announce that for the second year running AgriSearch have secured additional support for our sheep research programme from the Livestock and Meat Commission for Northern Ireland.

We would like to express our gratitude to the LMC for their invaluable support which has helped give our sheep programme a much needed boost.

Sheep programmes which are currently ongoing include:

- Investigation of the relationship between genotype, trace element status and gastrointestinal parasite infections in lambs, and the development of nutritional and management strategies to increase lamb output from grazed grass.

- Development of beef and sheep systems for improved sustainability, biodiversity and delivery of ecosystem services within hill areas of Northern Ireland.

- Developments in breeding strategies to further improve the production

efficiency of hill and lowland sheep systems.

- Provision of a ewe recording service to the Northern Ireland sheep industry.

- Development of a field guide to lameness diagnosis and treatment in sheep

Sheep research projects commissioned by AgriSearch are currently funded through a voluntary producer levy of 5 pence per lamb slaughtered through abattoirs in Northern Ireland. In addition to industry contributions, every effort is made to lever additional funding from complimentary sources such as the Department of Agriculture and Rural Development (DARD).

Research projects are recommended for funding by a Sheep Advisory Committee comprising of eleven people nine of which are farmers.

Ian Buchanan who has chaired the Sheep Advisory Committee since the formation of AgriSearch recently stepped down from that role to replaced by Samuel Wharry. Crosby Cleland has been appointed as Vice -Chair.

We would like to take this opportunity to thank Ian for his many years of service as Chair of the Sheep Advisory Committee.

It would also be remiss of us not to thank our 11 dedicated sheep farmer co-researchers who play such an important role in our sheep research programme.

- Lowland farmers
  - ⇒ Crosby Cleland
  - ⇒ Isaac Crilly
  - ⇒ Billy & John Martin
  - ⇒ Francis McHenry
  - ⇒ Alan Montgomery

- Hill Farmers
  - ⇒ Ian Buchanan
  - ⇒ Richard Duffin
  - ⇒ Joe & Seamus Maginn
  - ⇒ Maurice McHenry
  - ⇒ Stephen & Mark Montgomery
  - ⇒ Samuel Wharry

Developing more efficient hill ewes

In Northern Ireland, almost 60% of breeding ewes are found on the hills. As well as helping to sustain the rural economy, sheep grazing plays a vital role in managing upland habitats to promote greater biodiversity, to prevent encroachment by unwanted plant species and to help preserve the beauty of the countryside.

AFBI have been working with hill farmers in Northern Ireland for almost 20 years, seeking to develop more efficient breeding and management strategies for profitable hill farming systems. This work, which is jointly funded by the Department of Agriculture and Rural Development, AgriSearch and the Livestock & Meat Commission (LMC), has clearly identified the financial benefits of developing more productive and efficient hill ewes.

Crossbreeding

Crossbreeding provides an opportunity to introduce desirable traits into the flock, such as improved fertility or higher lamb growth rates. With the superior ewes becoming available for breeding inside 2 years, rapid progress can be made in a short period of time. A range of crossbreeding sires for Scottish Blackface ewes have been evaluated by AFBI, with options considered for improving both ewe performance and lamb performance traits. These options are outlined in Table 1.

Typically, crosses with maternal breed rams produce the greatest improvement in ewe fertility and subsequent efficiency. Compared with the pure Blackface flock, Lleyn X Blackface ewes were found to rear 18 more lambs per 100 ewes put to the ram, closely followed by Swaledale X Blackface (+14 lambs). The Swaledale crosses however had better longevity than the Lleyn crosses so their overall lifetime lamb output was similar. A disadvantage with the crossbred ewes is that they tend to be heavier than the

Table 1. Performance of crossbred hill ewes on 6 commercial flocks (averaged over 5 lamb crops)

	Ewe breed				
	Blackface (BF)	*Swaledale X BF*	*Cheviot X BF*	*Lleyn X BF*	*Texel X BF*
Mature body weight (kg)	53	55	60	56	59
Lamb born/100 ewes mated	140	157	146	159	149
Lambed unaided (%)	76	80	73	74	62
Lamb weaned/100 ewes mated	117	131	126	135	129
Ewe efficiency*	0.75	0.79	0.74	0.83	0.76
Replacement rate (%)	26.8	23.8	24.7	26.0	25.5

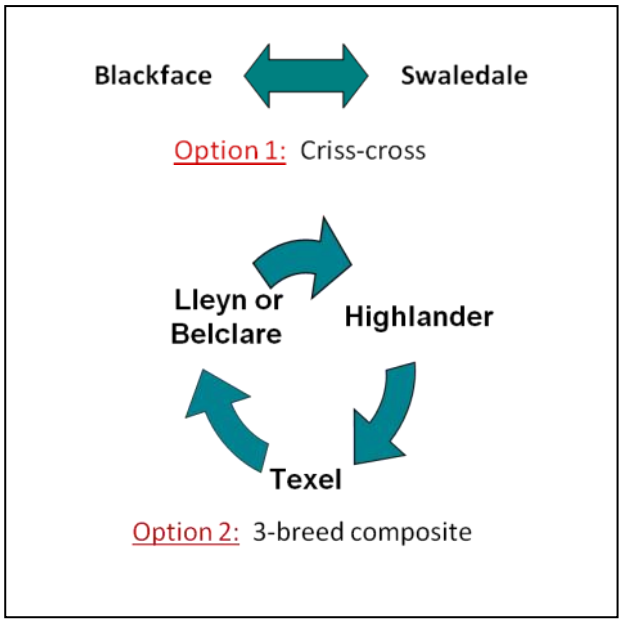
* Kg lamb weaned per unit of body weight (target = 1.00)

Blackface, especially crosses to the heavy mature weight sires such as Cheviot and Texel, which impacts their feed requirements and also their efficiency (in terms of the weight of lamb weaned per unit of body weight). Texel X Blackface ewes also had a higher incidence of lambing problems. However, overall, efficiency of the crossbred ewes was equal to or superior to that of the purebred Blackface.

3-way crosses

Whereas crossbreeding has been proven to increase production efficiency, the range of superior traits in the first-cross ewes is generally limited. Developing a 3-way cross provides an opportunity to introduce additional traits from a third breed to help make further progress. AFBI are currently evaluating two very different 3-way crosses for hill flocks: 1) a criss-cross between Blackface and Swaledale, aimed at hard hill areas, and 2) a 3-breed rotation combining Lleyn or Belclare, Highlander and Texel, suited to more 'green' hill areas. Results from the first phase of the trial (1 and 2 crop ewes) are outlined in Table 2.

The criss-cross horned ewes are typically 4 to 5 kg lighter than the 3-breed composites and therefore require less feed inputs, so they should maintain their body condition better



on the more extreme hills. To-date, all of the 3-way crosses have achieved high levels of performance for their age, with fewer than 10% ewes barren and ewes rearing on average 1.21 lambs. With the exception of the Texel crosses, whose lower litter size limits their lamb output, all of the breeding strategies evaluated have so far delivered weaning efficiencies of around 90% and above – 15 to 20% higher than pure Blackface ewes. This work will continue for a further 2 years to help assess the lifetime productivity and longevity of these 3-way crosses.

The main disadvantage with this approach is that it can take up to 4 years before the superior ewes are available for breeding.

Table 2. Performance of 3-way cross ewes on 6 commercial flocks (1 and 2 crop ewes)

	Weight at mating (kg)	Lambs born/100 ewes lambed	Lambs weaned/100 ewes lambed	Ewe efficiency (kg lamb weaned per kg ewe)
Criss-cross				
Blackface X	47	131	114	0.92
Swaledale X	48	156	136	0.96
3-breed crosses				
Belclare X	53	149	120	0.91
Highlander X	50	154	131	0.97
Lleyn X	51	128	113	0.88
Texel X	53	134	1.10	0.82

Dungiven Farm Trials Kiwi Ewes

Ian Buchanan and family of Dungiven, Co Londonderry are helping AFBI scientists compared a range of crossbred ewes in trials selected for support by AgriSearch, the Northern Ireland Agricultural Research and Development Council.

CAFRE senior sheep technologist Neville Graham leads visitors to the next stop on the AgriSearch Dungiven farm walk towards better profits.

During an AgriSearch farm walk on Ian's sheep and dairy farm over a 100 fellow farmers were updated on results from using composite sheep from New Zealand in three ways crosses.

Faces of our farming future, from left, Colin Taylor, Daniel Murray and Mark Malcolmson at the AgriSearch update on the Buchanan family farm.

A composite sheep developed in New Zealand to produce a maternal ewe with high fertility and easy lambing traits, is being used in three way crosses with two other white faced breeds, the Belclare developed in Galway and the Texel, which originated on the Dutch Texel Islands.

This is part of an exciting AFBI on farm research programme aimed at making local sheep units more efficient and hence more profitable. As part of this trial the Buchanan family are also crossing the horned breed traditionally used in the

Sperrins, the Scottish Blackface, with the Swaledale, which is so popular in the Yorkshire Dales. Other sheep on the Buchanan farm are mostly crossbred ewes with the main flock lambing in March and April. Teaser rams being used to keep lambing times tight.

Visitors to the AgriSearch Co Derry farm walk run in association with the National Sheep Association also heard that ewes are housed in December and winter clipped by early January. During late pregnancy they are fed a TMR, total mix ration, of silage along with meal bought through Sperrin Producers Co-op. Founded in 1990 and with over 200 members this Co-op includes a lamb marketing group and allows members to buy meal, fertiliser and fuel at group rates.

After lambing the Buchanans put their single suckling ewes and hoggets back to the hill with multiple suckling ewes given a run on lower fields.

In lively discussions during this farm walk on topics such as sheep breeding, health and nutrition the AFBI scientists, CAFRE advisors and local farmers kept coming back to a common theme, the need for simple, accurate and easily used records.

Ian Buchanan noting that the Hillsborough Management Recording Scheme developed by AFBI with farmers helps identify ewes in commercial flocks best suited to easier-care systems that reduce production costs. Thus replacement sheep can be bred that require limited help at lambing time and produce a good crop of lambs with a will to survive and thrive.

Key players at the AgriSearch sheep event near Dungiven included, from left, AFBI vet Jason Barley, senior sheep advisor Neville Graham from Greenmount College, host farmer Ian Buchanan and Dr Alistair Carson, head of AFBI, Hillsborough.

Breeding strategies for efficient lowland flocks

The Northern Ireland sheep flock has declined by almost 17% in the past 10 years. In addition to the 700 flock owners who decided to cease sheep production during this period, the average flock size of those that remained has also declined, from 121 to 109 ewes per flock. When asked the reasons why, many consider sheep production to be 'too much work for too little money!'

For the past 15 years, AFBI have been working alongside lowland sheep farmers from around Northern Ireland, undertaking research to help identify and develop more efficient breeding and management strategies, and ultimately to make sheep farming more profitable. This work, which has been jointly funded by the Department of Agriculture and Rural Development (DARD), AgriSearch and the Livestock & Meat Commission (LMC), has identified two main constraints on the profitability of sheep farming – poor ewe fertility and a high incidence of lambing difficulties. Progress on both of these key areas can be made by selecting suitable genetics for both the sire and dam lines.

Breeding more productive ewes

Ewe fertility is the single most important factor affecting the profitability of sheep farming. The key to increasing lamb output from the flock without keeping more ewes is to develop maternal breeding strategies which deliver more lambs per ewe. Over the past 3 years, AFBI have been evaluating the use of a rotational breeding strategy to develop ewes with good maternal characteristics which can deliver high levels of lamb output to current market specifications (conformation grade R or better). This work has been undertaken on 6 commercial lowland flocks from across Northern Ireland. The results obtained so far are outlined in Table 1.

The crosses examined in this trial had an average body weight of 59 kg at mating and are expected to reach a mature weight of approx. 65 kg, which is 10-20 kg lighter than the more traditional lowland ewe types such as the Mule or Suffolk X Cheviot. Within the 3-breed rotation, Highlander X ewes recorded the highest weaning rates of all the ewe breeds studied. Ewe efficiency, in terms of the weight of lamb weaned per kilogram of ewe body weight, is a good indicator of flock performance and is closely linked to a flock's carbon footprint. All of the ewes achieved efficiencies of 0.80-0.90, that is, their weaned lamb output was equivalent to 80-90% of

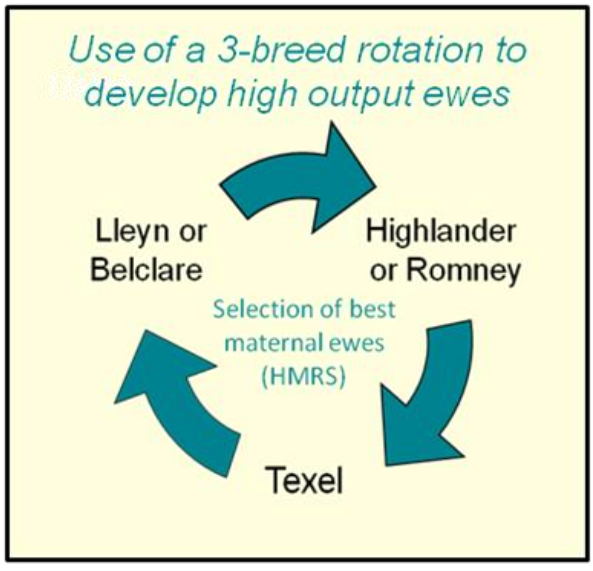


Table 1. Performance of crossbred ewes on 6 commercial lowland flocks (1 and 2 crop ewes)

Ewe breed	Weight at mating (kg)	Lambs weaned per 100 ewes lambed	Lamb growth rate birth-weaning (kg/d)	Ewe efficiency (kg lamb weaned per kg ewe)
Lleyn/Belclare X	59	146	0.24	0.82
Highlander X	60	167	0.26	0.90
Romney X	60	149	0.25	0.86
Texel X	60	135	0.26	0.88

their body weight. The Highlander X ewes again excelled on this front due to their superior weaning rate. This work is still ongoing and will continue for a further two years to examine the longevity and lifetime performance of these novel ewe types.

Ram selection

The ram contributes 50% of his progeny's genetics so ram selection can have a profound effect on lamb growth performance and carcass quality across the entire flock. Research at AFBI has also found that ram breed selection is a key factor influencing the level of lambing difficulties in ewes, especially for terminal sire breed rams where up to 40% ewes may require assistance at lambing. For the past 3 years, AFBI have been investigating the use of Primera® rams on lowland flock to help reduce the incidence of lambing difficulties. The Primera® is the product of a terminal sire breeding programme in New Zealand which aims to improve lambing ease, lamb growth performance and the eating quality characteristics of lamb meat.

Ram breed effects on lamb performance and carcass quality are outlined in Table 2. Using Primera rams was found to reduce the incidence of lambing difficulties by about one third compared with using either Suffolk or Texel rams. Growth performance of the Primera lambs was similar to that of the Suffolk lambs and superior to the Texel lambs, with Primera-sired lambs producing a 20kg carcass up to 17 days earlier than Texel crosses. The greater lambing ease with the Primera rams was however associated with some loss of carcass conformation in their lambs. Being an earlier maturing breed, the carcasses of Primera-sired lambs also tended to be slightly fatter at a 20kg carcass weight. Thus for lamb finishing systems feeding high levels of concentrates, it is likely that a high proportion of Primera lambs will become overfat. However, within systems based solely on grazed grass, Primera lambs are likely to reach finished condition more easily, especially during seasons where grass quality and/or quantity may be limited (e.g. by prolonged heavy rainfall).

Table 2. Effect of ram breed on lamb performance and carcass characteristics (slaughtered at 20kg carcass weight)

Ram breed	Assisted births (%)	Age at slaughter (days)	Conformation score[1]	Fat score	% EUR grades
Primera	12	172	3.11	3.16	82
Suffolk	16	168	3.30	2.97	86
Texel	17	189	3.30	2.99	90

How big is your footprint?

Global warming is an issue which has hit the news headlines often in recent years. However few people realise that in Northern Ireland, agricultural is the biggest single contributor to global warming, producing over 26% of our greenhouse gas emissions. However research at AFBI is developing strategies to help sheep producers measure as well as reduce their carbon footprint.

What are greenhouse gases (GHGs)?

GHG is a collective term for a number of gases that are known to exhibit a 'greenhouse effect' in the Earth's upper atmosphere, preventing heat from escaping into outer space and hence contributing to global warming. There are 3 main GHGs which are particularly important to agriculture:

Carbon dioxide (CO2): produced directly by burning farm fuels (diesel, petrol, etc), applying lime and urea fertilizer to soils and incineration of waste, and indirectly, through the manufacture of farm inputs (mainly nitrogen fertilizers and concentrates).

Methane (CH4): produced mainly as a by-product of fibre digestion by ruminants (cattle, sheep & goats), during the storage and application of slurry and farmyard manures, and from manure deposited by grazing animals.

Nitrous oxide (N2O): produced by natural processes in soils and promoted by the application of N fertilizers, slurry, farmyard manures and from manure deposited by grazing animals.

The primary sources of GHGs in Northern Ireland are shown in Table 1. In volume terms the production of carbon dioxide, mainly from fuel combustion, accounts for the majority of GHGs produced in NI. However agriculture's contribution is made disproportionately high by the fact that the global warming properties of methane and nitrous oxide, which are produced almost exclusively by the agricultural sector, are 25 and 298 times greater than that of carbon dioxide respectively. In 2011 the Stormont Executive set targets for a 25% reduction in Northern Ireland's GHG emissions by 2025 (based on 1990 levels). Meeting this target

Table 1. Main sources of greenhouse gases in Northern Ireland (2009 data)

Sector	% total GHG emissions in NI
Agriculture	26.7
Transport	22.1
Energy Supply	19.0
Residential	17.4
Business	9.2
Waste Management	3.6
Industrial Processes	1.0
Public	1.0
Land Use Change	0.5

therefore poses a significant challenge to the NI agriculture industry.

How can sheep producers reduce their carbon footprint?

Research jointly funded by the Department of Agriculture and Rural Development (DARD), AgriSearch, and the Livestock & Meat Commissions (LMC), and undertaken by the Agri-Food and Biosciences Institute (AFBI), Hillsborough, has developed a carbon calculator to enable sheep producers throughout NI to quantify their carbon footprint. Figure 1 illustrates the main sources of on-farm emissions for a 'typical'' lowland flock.

The term 'carbon footprint' simply defines the output of GHGs (expressed as kilograms of carbon dioxide equivalents) per unit of product, which for a sheep flock is most commonly lamb meat but may also include mutton, wool, milk or breeding animals. The good news is that a flock's carbon footprint is closely related to the level of performance and technical efficiency. i.e. better flock performance equals higher profits plus a smaller carbon footprint. Table 2 provides an illustration for a 200 ewe lowland flock.

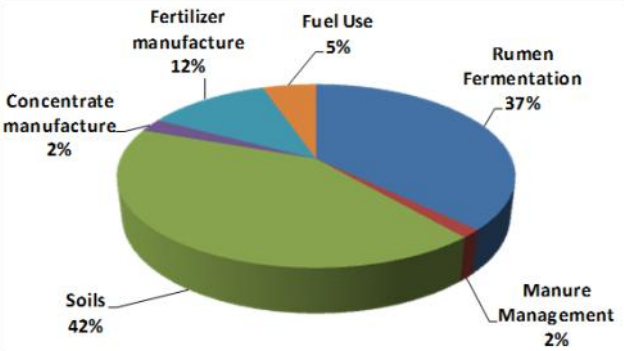


Figure 1. Main sources of GHG emissions from a lowland sheep flock

With relatively modest levels of performance, this flock has a baseline carbon footprint of 28.8 kg CO2-e per kg lamb meat. However, using new improved breeding and management strategies to achieve small improvements in ewe fertility, ewe replacement rate and lamb growth performance offers the potential to reduce the carbon footprint of lamb meat by up to 21%. By reducing inputs of nitrogen fertilizers and concentrate feedstuffs, and by making better use of grazed grass, a further 5% reduction in carbon footprint is possible.

Table 1. Impact of production efficiency on the carbon footprint of lamb meat

Target performance indicator	Improvement	Carbon footprint (kg CO_2-equivalents per kg lamb meat)
Baseline	200 ewe flock 1.4 lambs reared/ewe put to ram Lambs slaughtered at 250 days 25% ewe replacement rate	28.6
Ewe fertility	+0.2 lambs reared/ewe	24.7 -14%
Lamb growth performance	-30 days at slaughter	27.9 -2%
Ewe longevity	-5% replacement rate	26.9 -6%
All the above	All the above	22.6 -21%

Sustainable control of liver fluke in sheep flocks

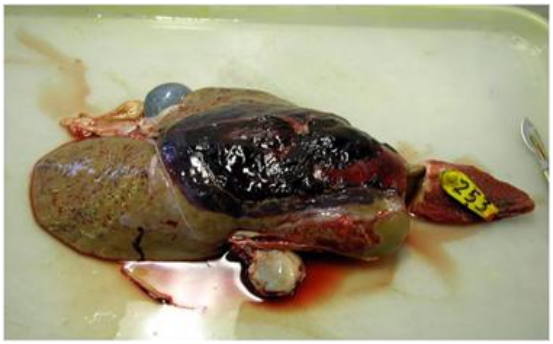
The level of liver fluke disease in sheep in Northern Ireland is increasing with the highest number of cases recorded since 2002 -03 being registered by AFBI during the period September 2012 to February 2013.

Liver fluke and the weather

The summer of 2012 was very wet in Northern Ireland, creating ideal conditions for liver flukes and their intermediate host (a mud snail that lives in wet, boggy areas). Even farms with no previous history of liver fluke experienced problems because of the unusual rainfall patterns. The pattern of disease was also different on known 'flukey' farms, where flooding, persistent water-logging and poaching meant that different parts of the farm became affected, altering the risk pattern compared to previous years. The poor summer also created higher stocking rates in the autumn, with more lambs left on farms than normal during the risk period for liver fluke. The high risk period in 2012 started in August with high levels of the infective stages of liver fluke on the pasture, leading to large numbers being ingested by grazing animals.

Why is controlling liver fluke so difficult?

Acute liver fluke disease is difficult to diagnose because eggs are not present in the dung at this stage. While additional diagnostic tests are under development, none of these is yet fit for purpose in the field, so a



lot of damage can be done to the liver before it is possible to confirm the presence of the liver flukes by egg counts. Drugs which kill liver flukes, known as flukicides do not all kill the same stages of parasite. Some have much better activity against early immature flukes than do others. Some strains of liver fluke are also developing resistance to triclabendazole, a commonly used flukicide with very good activity against early immature liver flukes. Thus it is vital that liver fluke control programmes are not only effective but also sustainable.

Detecting and Diagnosing Liver Fluke

1. Damaged livers cost money because the animals do not perform at optimum levels so early detection and diagnosis is vital. Use abattoir feedback: get into the habit of asking for information on liver rejections.
2. Investigate deaths: a post-mortem examination should give a very clear indication of the presence of liver fluke
3. Watch for clinical signs: these include weight loss and ill-thrift, sudden death, oedema under the chin (bottle jaw), anaemia, abdominal pain and respiratory distress.
4. Use performance indicators such as ewe body condition, live weight gains in lambs and young cattle, milk yields and scanning results.
5. Ask your Vet about liver fluke egg detection tests. The Vet can also use

blood tests which indicate whether animals have been exposed to liver fluke to help with detection and diagnosis.

The **SCOPS** (**S**ustainable **C**ontrol of **P**arasites in **S**heep) working group on liver fluke has provided useful and practical guidance to flock owners on the treatment and control of liver fluke disease.

Treatment options

⇒ Use the right product for the right stage (s) of liver fluke.

⇒ Where the risk is high and you need to kill immature fluke, Triclabendazole (TCBZ) is the drug of choice unless it has been established there are resistant liver fluke on the farm. In this case seek advice on suitable alternatives.

⇒ Be aware of the risk of re-infection if animals are put back on high risk grazing areas. Use management tactics to avoid this where possible.

⇒ Treat ewes in spring to remove adult liver fluke and reduce egg output onto pastures. Use a product that will only kill adult fluke saving those which kill immatures for the autumn.

⇒ Avoid using combination fluke & worm products so you reduce selection for resistant worms.

Test that treatments have worked

Do a **Drench Check** by taking faeces samples 3 weeks after any treatment. If there are still liver fluke eggs present in the faeces then seek advice on what further tests you need to do to establish whether you have liver fluke resistant to that product.

Protect your flock – Quarantine

Could bought-in animals be coming from a flukey farm? If the answer is yes, then they need to be treated with a product that targets the right stage of liver fluke. There are 3 reasons why Quarantine treatments are important:

1. Prevent liver fluke disease and production losses in the in-coming animals.
2. Minimise the risk of introducing infection to fluke-free farms.
3. Minimise the risk of introducing anthelmintic resistant (AR) fluke to your farm

Always use best practice

⇒ Do not over or under dose, even if it means splitting into heavy and light groups.

⇒ Don't rely on chemicals alone – use management tactics as part of a combined strategy.

⇒ Choose the right product at the right time and check the withdrawal period.

⇒ Monitor the efficacy of any treatments.

⇒ Vaccinate at risk stock against 'Blacks Disease' using an appropriate clostridial vaccine.

Management options to minimise exposure

Management options are not easy in practice but some of the following may be possible:

⇒ Avoid flukey pastures and/or wet, boggy areas within fields during peak risk periods to limit exposure. This may mean fencing off risky areas or, in some cases, avoiding whole fields.

⇒ House animals post treatment, where practical, to avoid re-infection.

⇒ Quarantine in-coming stock and treat if they are from a flukey area.

⇒ Monitor the risk using fluke egg detection and blood tests

⇒ Plan ahead now for next year. Install or repair fencing and drainage systems, and install water troughs to prevent animals drinking from high risk ponds or boggy areas.

KILLOUGH SHEEP WALK SUCCESS

FOUL weather failed to deter the cream of Co Down sheep farmers from attending a very successful AgriSearch farm walk at J.H. Montgomery and Partners, Killough.

Over 80 producers heard AFBI vet Jason Barley warn about the dangers posed to sheep flocks by fluke following the wettest year in a generation. Weather in which fluke and their snail hosts thrived and spread, often following flooding, onto grazing land not normally associated with this deadly parasite.

Jason Barley of AFBI, VSD outlining the options for control of fluke in sheep

Mr Barley also reminded producers that the range of animal health products available to combat fluke was still very limited. Thus fluke are developing resistance to some products so care must be taken by farmers neither to under or over dose.

Host Farmer Alan Montgomery

Another topic covered at this event organised by AgriSearch in conjunction with the NSA, AFBI and CAFRE was the need to check for mineral deficiency. An AFBI survey across NI found that 68% of ewes tested were deficient in selenium with the problem especially common around Killough, up the Strangford shore and on the Ards.

Getting your local veterinary practice to take a blood sample from ewes a month before lambing was strongly recommended. This can then be checked by AFBI, Stormont labs for important minerals such as cobalt, selenium, copper, zinc and iodine.

In a lively debate between guests speakers, Alan Montgomery and other farmer co-researchers covered other topics including ensuring pregnant ewes were properly fed in a winter where many producers are left with only mediocre silage in the wake of endless wet weather last 'summer.'

The role of simple record keeping in boosting flock efficiency and reducing workloads at

lambing time was also discussed. Host Alan Montgomery, a founder member of Strangford Down Lamb Producers Group, provoking a lively debate when he reported on AgriSearch supported trials conducted on the farm with AFBI scientists. This includes a rotational breeding programme producing replacement ewes using Belclare, Texel and Highlander crosses.

This year Alan is again feeding ewes in the month before lambing on a maize silage based diet supplemented with soya in late pregnancy. Stubble turnips being kept for store lamb finishing.

AgriSearch vice chairman David Workman, right, meets some of the young, progressive farmers enjoying the 'excellent' farm walk for lamb producers at Killough, from left, Johnnie Bell, Rathfriland, Robert and Stuart Cromie, Banbridge.

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Northern Ireland Agricultural Research and Development Council (T/A AgriSearch)
97 Moy Road
Dungannon
County Tyrone
BT71 7DX

Tel: 028 8778 9770
Fax: 028 8778 8200
Web: www.agrisearch.org

AgriSearch NI
Farmer Funded Research