Future Dairy Farming: Putting Research into Practice

Hosted by

Farmers Weekly Dairy Award Winner

Hugh McClymont

SRUC
Crichton Royal Farm
Dumfries

7th May 2014

Organiser

Award Sponsor
Welcome

As the 2013 Farmers Weekly Dairy Farmer of the Year Award Winner, I personally extend a warm welcome to all attending this Open Day titled

**Future Dairy Farming: Putting Research into Practice**

As the programme shows we have a wide variety of subjects and speakers which all relate to the Modern Dairy Farming Business.

This event, jointly organized by SRUC and RABDF would like to thank the many companies attending who have kindly sponsored the Day.

I trust you will have an interesting visit to SRUC Crichton Royal Farm and I thank you all for your support and attendance today.

Hugh McClymont

Research Farm Manager
Programme of Event

11.00  Welcome by Sian Mercer, RABDF
11.10  Welcome by Janet Swadling, Acting Chief Executive
11.20  Hugh McClymont, Research Farm Manager
11.40  Marco Winters, Head of Genetics, DairyCo
12.00  Lunch
13.00  Talks by SRUC staff
       - Maximising Dairy Calf Health – Colin Mason & Gareth Bayes
       - Systems & Breeding – Dave Roberts & Mike Coffey
       - Grassland Management – David Keiley & Pete Little
14.30  Summary and further questions
14.50  Chance to speak to SRUC specialists on Soils, Lucerne and Animal Behaviour.
<table>
<thead>
<tr>
<th><strong>SRUC – At a Glance</strong></th>
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<tbody>
<tr>
<td><strong>Land Area</strong></td>
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<tr>
<td><strong>Number of cows</strong></td>
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<tr>
<td>Crichton Royal</td>
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<tr>
<td>Acrehead</td>
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<tr>
<td><strong>Breed of cows</strong></td>
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<tr>
<td>Holstein Friesian</td>
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<tr>
<td>High Genetic (select line)</td>
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<tr>
<td>Average genetic (control line)</td>
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<tr>
<td>Holstein Friesian</td>
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<tr>
<td>Pedigree Commercial Cows</td>
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<tr>
<td><strong>Average production</strong></td>
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<tr>
<td>Range from 7000lt to 11000 ltrs/cow</td>
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<tr>
<td><strong>Replacement management</strong></td>
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<tr>
<td>Replacement Heifers calving at average 24mths</td>
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<tr>
<td><strong>Stocking rate</strong></td>
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<tr>
<td>Grazing Group 5.5cows/ha</td>
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<tr>
<td>Others Continually Housed</td>
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<tr>
<td>Housed</td>
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<tr>
<td><strong>Parlour</strong></td>
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<td>DeLaval 28:28</td>
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<td>GEA 24:24 Herringbone</td>
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<tr>
<td><strong>Grazing policy</strong></td>
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<tr>
<td>Rotational Grazing Paddocks for Home Grown Cows</td>
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<tr>
<td><strong>Ration</strong></td>
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<tr>
<td>Home Grown Feeds System—All feeds homegrown inc. Grass, Grass silage, Maize, Red Clover, Wheat &amp; Spring Beans</td>
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<tr>
<td><strong>Forage crops grown</strong></td>
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<tr>
<td>Grass, grass silage, Maize silage, red clover silage, wheat, spring beans, Lucerne.</td>
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| **Number of staff** | Farm Manager – Hugh McClymont  
7 full time employees.  
7 part time employees  
4 Technicians plus researchers and research Students. |
|---------------------|--------------------------------------------------|
| **Estimated turnout date** | Home Grown System 14th March, totally Housed Dec 1st  
All other Groups Access Grazing for part of the Season |
| **Calving policy** | All year calving. New Calf Igloo Housing system. Weaned at 50 days. Reared indoors till scanned in calf and allowed to graze if available. Dry Cows Housed during Dry Period |
| **Milk buyer** | Arla |
Good Morning and a very Warm welcome to all the visitors to Crichton Royal Farm today, I do hope you have an interesting and rewarding visit.

My talk is about the farm and what our function is within the Dairy sector.

The Farm Team that actually run the ship, I only sail it, which I am grateful for their dedication and loyalty which shows in their many years service on this farm. Jim Gordon 28 years, James Coupland 27 years, Peter Little tomorrow clocks up 25 years, Darren Young13 years, Dawn McCallie 9 years and Samantha Haining who has 2 years whilst studying at SRUC Barony Campus and working also. This team is also supported by an additional seven part time and contract personnel for night milking and relief work. As a Research facility there are additional technical personnel on the site and the harmony that exists between both teams is tremendous, this is one of our major strengths and why this facility can deliver quality Research outcomes. Our people are our major asset so we endeavour to maintain a healthy working environment for all.

In addition to the above staff I engage a number of contract personnel, the majority of our field operations including harvest is carried out by three main contractors and additional smaller operatives. This allows me to be efficient in timing in all these operations as well as cost control. I believe in safety in numbers but as you can imagine these teams can be challenging to manage some more than others. For example at Grass Silage Making, there can be two silage teams working on separate areas of the farm but achieving a tremendous work output to make quality forage in whatever weather window is available.

On the note of Dairy Research, trials are recorded of being conducted on this site in 1920 by the West of Scotland Agricultural College with the dairy herd looking at ways of increasing milk production from the herd. The management and the tenancy of the farm changed from the local Health Board to the College, WOSAC, SAC and now SRUC, which is part of a 25 year lease from the Scottish Ministers.

Currently the total land area is over 300 ha all of which is tenanted, 240 on a full agricultural tenancy and remaining land either on Short Limited Duration Tenancy or seasonal grazing arrangements. The soil type is predominately Sandy loam and ranges from river level to 45 metres above sea level. All the land sits within the Lower Nithsdale NVZ. Predominately free
draining which allows us to grow a range of crops such as grass, maize, wheat, Beans, red Clover and also a small amount of Lucerne.

But with an annual ‘Average’ Rainfall of 1.1mtr, recent extreme weather has proved challenging on this farm as with others.

The livestock presently consists of 550 + cows with 280 at this unit at Crichton and remaining 230 at Acrehead facility. Young stock currently is in the region of 320 animals. Both Milking Facilities are on 3x day with total milk sales to Arla in the region of 4.3 million litres from the all year round calving herds at both sites.

Like all land managers we have to maintain a healthy environment not just for today but for the future, so we have embraced a number of initiatives. Probably the most significant is our use of Organic manures and the reduction of purchased fertilisers. The farm is mapped regularly for soil status and the amount of purchase N is now at 50tonnes from 150 tonnes 10 years ago with no P and K purchased in the last 8years.

This has been achieved by a number of initiatives including shallow injection, underground pipe network, slurry separation mechanical and natural, analysing and budgeting of nutrients required for each crop requirement. This has led to further Research work in this area on behalf of Dairy Co.

We have a number of areas of the farm where we have created wildlife habitats which have been successful and these areas such as water margins, extended hedgerows, mown grassland for birds and species rich meadows have been extremely interested by local Butterfly groups and led to a Memorandum of Understanding with the RSPB which involves auditing farmland birds on an intensive lowland Dairy Farm. With numbers increasing of these species it is rewarding for the farm that we are doing our bit!
The amount of Research that has been and currently undertaken at Crichton is phenomenal and some highlights that I recall are cows wearing nappies (to collect output and not milk), cows with special head collars with devices to collect methane whilst grazing, Moosic being played to cows, various feed evaluation trials, measuring Methane production with a gun, many various behaviour studies, spreading slurry by hand, feeding By products, outwintering studies and recently zero grazing work has started. Greenhouse Gas emissions recorded with myself the largest contributor but this study will employ drones to measure the gas from the field.

As another important factor we also welcome like today a huge range of visitors to this site which range from Primary School to Secondary Schools through my involvement with the Royal Highland Education Trust (RHET), students from local colleges, SRUC students and farther a field, Farmer Groups, Trade organised events to MSPs and other dignitaries.

Other groups who have visited have been local Rotary Clubs and we have participated in Open Farm Sunday for a number of years. This work which falls under the banner of Knowledge Transfer is extremely rewarding for all involved.

Finally I cannot but not mention we have a herd of 500+ cows that are all Holstein Friesian and the internationally known Langhill Herd is here at Crichton. A momentous day back in 2002 saw 180 cows and 220 youngstock exchanged with the University of Edinburgh to create the Langhill Herd at Crichton. Since then under the careful guidance of Professor Mike Coffey I have sourced many varied sires for this breeding project from a range of Breed Companies. The whole breeding story which will be discussed later has been fascinating to be part of, as this herd was formed in the early 70’s and still we have 2 distinct breed lines of High Genetic Merit (Select) and Average Genetic Merit (Control) and they continue to be as wide a range as possible.

With the Herd at Crichton Royal farm here we have Langhill and the current systems work of Bi Products and HomeGrown, where 100 cows (50 of each Genetic Merit) are on a Bi Product Ration and the same number are on a total Homegrown Feeds Ration.

The latter relies heavily on the availability of good quality Grazing and the harvest of quality feeds such as grass silage, Maize silage, Beans and Wheat.

The Bi Products System has been a tremendous challenge but we have made the system work which has created a huge interest throughout the UK and beyond.
The whole herd at Crichton is managed and recorded as 5 individual herds which adds a considerable amount of management time and effort which all the team have had to embrace.

All female animals at Crichton are registered with HUK under the Langhill prefix.

At our other site Acrehead, there are 230 cows with 190 milked 3 x daily. This herd which predominately is Pedigree is selectively bred to high index sires with the top third being served with HF and occasional Sexed with the remaining two thirds put to Beef sire British Blue. The rationale for this as we have a surplus of cows from Crichton Herd that are transferred to Acrehead to allow replacement Langhill Heifers enter that herd. Subsequently Acrehead herd has older cows with average lactation length of 5 years and Langhill sits at 3 years.

Finally you will see today the first opportunity to view our new Calf House designed to maximise natural ventilation with shelter provided by large igloos. This represents a considerable investment on the farm but more importantly this will allow us to care for the most important animals on the farm in their early weeks.

Ladies, Gents, Friends, Colleagues, I could talk all day and night about Crichton Farm as hopefully you will have picked up, I am passionate about the place and the work that continues.

There are a few people I would like to thank for the Award that I received in London in October 2013. First of, the Judges for choosing me and the Sponsors Dairy Co who are here today.

Dr Dave Roberts whom I have worked alongside for more years than I care to mention but has allowed me to take Crichton Royal Farm forward, the Team here at Crichton which make it all possible, SRUC for the continued support.

And finally all of you here today for your continued support in all that we do in this fascinating industry.
Raising Herd Profitability Through Better Breeding

Marco Winters

- The last few decades has seen many significant improvements in the breeding tools available for use in the dairy industry.

- The information available on AI sires today is more complete and more accurate than ever before; making choosing the right bull to breed the next generation of cows to suit the UK systems much easier.

- Research in the UK combined with R&D from abroad, alongside a high quality national recording through herdbooks and milk recording has provided new knowledge and tools for the UK dairy cattle breeding industry.

- An important source to many of these developments, has been the information generated by the selection experiments of the Langhill and more recently the Crichton Royal herd.

- In the early days of using genetic indexes, the Langhill herd served as a demonstration farm and provided evidence of the power of genetics in shaping the performance of a herd, irrespective of its feeding regime.

- More recently the Crichton Royal herd has attracted world-wide interests because of the vast amount of data, alongside unique genetic and genomic information which it is able to contribute to some exciting new research; such as the genetics of dry matter intake and genomic discoveries.

- The UK dairy breeding industry has benefited from this acquired knowledge and has incorporated this into the development of the dairy indexes.

- Over the last 15 years new health and fertility indexes have become available for use, alongside the well-established yield and conformation traits.

- The broadening of breeding goals to incorporate this new fitness is now well established and has taken form in the Profitable Lifetime Index (£PLI) which can be used to rank bulls suitable for the vast majority of farming systems.

- The £PLI will see a further update in August 2014 with a further increase in importance of health and fertility and also will incorporate two new elements; Calving performance and Maintenance
cost. (Note that much of the ground work on genetics of body condition scoring, body energy requirements and predictions of mature liveweight were developed using Crichton data).

• In August 2014 a new index will also be introduced; created specifically for spring block calving systems which place a heavy reliance on grazed grass. The Spring Calving Index (£SCI) like the £PLI index, represents the additional profit a high ranking bull is expected to return from each of its milking daughters over her lifetime compared to an average bull of £0.

Make sure you don’t lose out and improve your herd’s profitability through better genetics

1. Set YOUR own realistic breeding goals
2. Understand your herd’s strengths and weaknesses
   3. Understand how to use all the tools available to you (incl. £PLI, £SCI and Genomics)

There is a bull to suit every system, make sure to breed the right cow for YOUR system!

For more information visit: www.dairycobreeding.org.uk
Dairy heifer calves are the future of any herd and the animals with the highest genetic potential. In order to maintain the highest production levels possible for the adult herd it is important to reduce involuntary cull rates and ensure that when cows are culled they are selected voluntarily. For that to happen to best effect having as many heifer replacements as possible is essential and dairy calf health is key to achieving this.

The following key points will be discussed in our presentation in the light of changes to calf management that have been introduced at Crichton Royal Farm.

- One study (Bricknell et al 2009) has shown that on average 48.2% calves born have diarrhoea pre-weaning and 46.5% of calves born have pneumonia pre-weaning.

- The same study showed that overall calf mortality rates between birth and first calving were 14.5%. Both measures are too high.

- Calves should be snatched from their mothers as soon as possible after birth to reduce disease challenge and cross sucking risk.

- Calves should receive 10% of their body weight (4 litres for a 40kg calf) in the first 6–12 hours of life.

- Colostrum should be as clean as the milk going for human consumption, high quality (assessed by a colostrometer) and if stored, stored frozen, not kept at ambient temperature.

- Navels should be dipped with Iodine.

- Calf growth rates should be between 0.75 and 0.8kg / day. A rule of thumb is they should double their birth weight by weaning. Evidence shows that growth rates to weaning are significantly correlated to milk yields in first lactation and survivability in the herd in general.

- To achieve this calves’ need to be disease free and receive a good quality, high protein milk replacer with high levels of intake. Strategies to achieve this will be discussed.

- At temperatures below 9°C new born calves need to use up energy to keep warm. In Scotland this is relevant for around 6 months of the year and strategies to keep calves warm such as jackets are required.
Disease due to scour is best prevented by obsessive attention to hygiene when handling and moving between batches of calves, keeping the area as dry as possible and avoiding the production of aerosols.
A systems study has been established, at The SRUC Dairy Research Centre, with two contrasting dairy systems. One system relies on all feed being grown on the farm, hence using the maximum amount of land. The other is based on by-products (co-products) with the direct use of the minimum amount of land. The systems were established in September 2011 with cows from the two genetic lines. There are therefore 4 systems groups each with about 50 cows in lactations 1 – 3.

The basis of the home-grown feeding system is that all feed, except minerals and vitamins, are grown on the farm. The system was designed to achieve milk sales of about 7,000 litres/cow/year. During the summer months the cattle are grazed, between morning and evening milking. After the evening milking the cows are housed and fed a ration based on maize silage and wheat. The area required for this system depends on forage yield and quality but is about 0.9 cows/ha.

The basis of the by-products feeding system is that the cows are fed on by-products (co-products) which are not normally used in human diets. In order to ensure a difference in milk sales between this system and the home-grown system the rations were formulated to achieve milk sales of about 11,000 litres/cow/year. The ingredients in the ration are straw, sugar beet pulp, breakfast cereal / biscuit meal, vitagold, soya, distillers grains, molasses, protected fat. Straw makes up a quarter of the ration on a dry matter basis, therefore the quality and processing of this straw is crucially important to ensure that rumen function is maintained. The fat content of the milk, especially the control genetics group at 3.39% is a concern.

### Milk sales (12 months up to April 2014)

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<thead>
<tr>
<th></th>
<th>Milk sales (l/cow/year)</th>
<th>Fat content %</th>
<th>Protein %</th>
<th>Calving Interval (days)</th>
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</thead>
<tbody>
<tr>
<td>HGS</td>
<td>8104</td>
<td>4.09</td>
<td>3.36</td>
<td>390</td>
</tr>
<tr>
<td>HGC</td>
<td>7132</td>
<td>3.85</td>
<td>3.17</td>
<td>381</td>
</tr>
<tr>
<td>BPS</td>
<td>10549</td>
<td>3.68</td>
<td>3.09</td>
<td>404</td>
</tr>
<tr>
<td>BPC</td>
<td>8046</td>
<td>3.39</td>
<td>3.00</td>
<td>385</td>
</tr>
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Maximising the Potential from Grass

David Keiley & Pete Little

Background

With World population at around the 7.3 Billion currently and growing, the allocation of fresh water and land will become the main issue facing government’s in the future. Protein and energy supplied from dairy cows will become crucially important for existing markets and developing countries.

Ruminants convert carbohydrates, protein and energy into milk, fibre and meat efficiently. The world demand for commodities such as skimmed milk powder by the China and India will increase.

Future dairy markets will be subject to greater price volatility going forward and greater demand for cereals and soya. The main current issue post 2015 being the demise of the milk quota regime and the potential for expansion from the Irish and European markets.

Improved management of Grassland

In order to cope with market price fluctuations, UK dairy producers use their strengths to their advantage. Temperate climates have suitable conditions for the production of grass. Unlocking the potential in grassland is key to enhancing the future prospects for the farmers under more competitive world market conditions.

Research has shown that as more grass is utilised in dairy cows diets the higher the potential profit per hectare. Farms which made better use of home grown feed stuffs – grass, wholecrop, cereals and fodder crops generally increased their profitability per hectare.
Well managed grass, correctly fertilised land containing productive grasses can produce 11 – 14 tonnes of dry matter/ha in a season. In order to achieve this, sward and land management have to be optimised.

**Compaction**

Compaction in grassland has been shown to reduce yield by up to 20% in first and second cut silage crops. Similarly compact damage allow the ingress of weeds and less productive natural grasses into the sward. Remedial action such as sub-soiling and sward lifting allow better drainage, helps microbial activity and increases yield.

**Soil Nutrient Status**

Recent soil analysis over various catchments in south west Scotland saw typical pH’s around 5.5. Lime is the cheapest form of fertiliser. Reducing soil acidity makes soil nutrients more available to the plant. Increasing the pH from 5.5 to 6.2 will increase grass yield be 9%.

P & K are also essential for grass growth. Dairy producers have available P & K in the form of slurry and manure. Soil analysis and measuring the qualities of nutrient applied improve on farm efficiency and reduce artificial fertiliser costs.

**Weed Control**

Increased populations of weeds reduce the yield, energy content and quality of grass and clovers consumed. Docks for example reduce yield by up to 3.4 t/ha. Spot spraying, topping, and the use of sheep strategically can reduce weeds.

**Grazing Infrastructure**

Having available fencing, tracks and water troughs allow the grazing season to be extended into the autumn and have earlier turnouts in the spring. In difficult conditions good infrastructure makes a significant difference even in heavy soil conditions.

**Reseeding**

Grass varieties are constantly improving. Typically newer grass will yield over 33% more in the first year. Modern grasses have high palatability, increased nitrogen efficiency.

**Measure, monitor and manage**

Modern grassland management software developed in New Zealand and Ireland help farmers make the best use of the grazing wedge and looks at productivity over the growing season. Using such technology allows farmers to make better choices and optimise their grassland.