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'Is Dairy Farming the Solution?'

PROCEEDINGS

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EU without Milk Quotas with Special Reference to Ireland

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Summary

The EU milk quota system has been in place for 23 years, and is expected, to be dismantled in 2015. The system was a success until the beginning of the 1990s where the surplus production was reduced and the milk price was stabilized, Hereafter the milk quota system has been unable to keep a stable dairy price and it has proved to be a very difficult instrument to use to fine tune the dairy market, and as a result the EU lost the dominating position on the world market for dairy products. In several EU countries the quota system has also hindered the structural development of milk production including Ireland. It has also lead to increasing cost for milk production and in many EU countries the cost of trading quotas exceeds the value of more than a years milk production.

The Commissions plan to dismantle the milk quota system opens for new opportunities, and especially for the North European countries, including Ireland, which are expected to increase the milk production. EU-27 will only be able to utilize 50% of the 6% increase (expected) until 2015 with 50% while several countries will keep milk production at the current level and some will experience declining milk production.

Ireland has the potential to expand the milk production in the short/medium and long term. However it is very important to implement an efficient quota allocation system without restriction to secure a concentration of the milk production structure with focus on economy of scale. The same is the case for the Irish dairy industry where a concentration is necessary to be able to make the huge investments in product development and marketing in the future.

1. Implementation of the milk quota system

The milk quota system was implemented in 1984 in the 10 EU Member States at that time and when new countries joined the EU, the system was implemented so the milk quota system is operating in 27 EU Member States today. The general rules concerning national quota, super levy, general rules for quota transfer and buy up schemes for milk quota are common for all EU countries. However, on a national level the milk quota system has been implemented in very different ways especially in relation to the specific quota transfer system and the efficiency of the milk producer information system. In reality the situation is 27 different milk quota system in EU with some general regulations. The effect has been different opportunities for the milk producers in the respective EU countries, and the major difference is in relation to national restrictions on the quota transfer. The more liberal implementation the less limitation on the structural development is the major lesson from the 24 years of the milk quota system. From 1984 until 1990 the MQS effectively limited the EU milk production and was the determining cause to the elimination of the record high intervention stocks of butter and SMP.

In the nineties the milk quota system was in a standstill with no major changes except the implementation of the system in Sweden, Austria and Finland, which became EU members in 1995. The EU reform in 1992 left the milk policy more or less unchanged, and the following GATT agreement in 1994 that was implemented from 1995 put the EU milk sector under pressure due to the limitations on the supported export of dairy products. The EU lost in the nineties the leading role on world market for dairy products.

After the turn of the millennium the EU began reforming the CAP and the reform in 2003 included the dairy sector with a 22% cut in the guaranteed price for milk via lowering the intervention prices, decoupling of support and a 3% quota increase over 3 years. The CAP reform means that the EU also for the milk sector is prepared for the expected WTO II agreement, which inevitable will eliminate the export refunds.
The last step is the “Health Check” in 2008 which has already paved the way for dismantling the MQS by increasing the national quotas by 2% from 1 April 2008 and the plan is to increase the quotas on a yearly basis until the abolishing in 2015. This will enable the EU milk producers to benefit from the improved market situation in EU and on the world market for dairy products.

2. The milk quota system: Failure or success?

The question can't be answered either yes or no. While the milk quota system has been a success in many aspects but on the other hand it has also caused some problems for the EU milk production.

The positive elements of the system have been:

- The milk production was stabilized in the short/medium term reducing the surplus production.
- The huge intervention stocks of butter and SMP were eliminated
- The milk price was kept at a stable level in the short/medium term
- The EAGFF expenditure to the market arrangement for milk and dairy products was improved substantially
- The milk quota system was an acceptable political decision in respect to regulate the milk market instead of severe price cuts. A supply management system allows politicians to give priority to special producer categories unlike linear price cuts.

The negative effects of the quota system came first in the medium/long term and they have different impact in the EU countries depending on the national strategy for the milk sector:

- The supply elasticity of prices has been very low because of the milk quota and that means a stable milk price however for some periods at a too low level.

- The milk price increased in the first five years with the quota system but from 1990 and onwards the milk price has been at a too low level compared to the main goal of the system: To keep a relatively high and stable price by restricting the supply of milk.

- The milk producer income was stable between 30,000 – 35,000 EUR for an average milk producer in EU. The alternative without the quota system could have been more lucrative as to the milk producers could how produced more milk in a situation.

- The structural development hasn’t been stopped by the quota system and has continued in the same pace as before. It has continued the normal development while it has been more important to create more competitive large dairy farms seen in the light of the global liberalization via WTO. The system has created an average milk producer while many small producers and some large producers have left milk production.

- The quota system has been capitalized and additional quota for increasing is an extra production cost at a variable level in the Member States. The capitalization makes it also more difficult to dismantle the quota system. The higher capitalization the longer dismantling period and this will delay the EU milk producer’s possibilities to respond to the increasing demand for dairy products.

- The positive effects in the short/medium term on the EU milk balance have changed to a situation where the EU is unable to profit from the increasing demand for dairy products. EU has since the mid nineties lost world market shares while Oceania, USA and newcomers like Ukraine and Argentina have taken over.

- The implementation and administration have lead to a lot of red tape in the member states and the milk producers have a lot of planning to keep within the milk quota.

- Milk production under the quota system is not optimal and leads to irrational decisions at farm level. It leads to stop-go production depending on the super levy situation for each farmer, and the focus on increasing the yield per cow has also been exaggerated.

3. Market opportunities

It was the increasing milk production in the beginning of the eighties combined with a stagnating demand for dairy products that paved the way for implementing the MQS in 1984. After 2000 the situation has gradually changed and in 2007 the demand was much higher than the supply of milk on a global basis, leading to increasing product and milk prices. The prospects for the future looks bright if the economic growth continues in Russia, EU-12, Asia and South America:

- From 2007 to 2014 the consumption in EU is expected to increase by 8 million MT milk equivalents

- In the same period the global demand for dairy products is expected to increase by 2.5% annually equalizing 134 million MT milk equivalents.

These positive prognoses pave the way for dismantling the milk quota system and increase the milk production in EU without significant price reductions. However the liberalization of the milk policy in EU means that the milk producers will experience more volatile prices in the future.

4. Milk production potential in EU 2008 – 2015

The milk production potential in EU-27 in the short/medium term until 2015 is very uncertain due to the negative effects of the milk quota system in 24 years mentioned above.

The starting point is not optimal due the declining milk production in EU the last three years. The quota year 2007/08 ends with low quota utilization – 2 million MT under the global quota level in EU. This means that the dismantling process with a 2% quota increase from 1 April 2008 starts below zero and just to reach the new quota level by the end of 2008/09 the milk production has to be increased by 4.5% (the quota is increased by 0.5% in EU-15 already decided in the CAP reform 2003)

The potential in the EU Member States has been evaluated and the conclusions are:

- The situation in the short term seems to be rather pessimistic in relation to reach the level of the annual quota increases
- In the medium term from 2012 to 2015 the milk production is expected to increase more than in the first period, but it is depending on the incentives given to the EU milk producers from the Council of Agricultural Ministers
- In EU-15 there are only 6 countries that are expected to be able to increase the milk production in line with the quota increase (Austria, Denmark, Germany, Ireland, Italy, Luxemburg and Netherlands) while others remains at 2008-level (France, UK, Belgium, Spain, Portugal and Greece) and still others will continue

to decrease milk production (Sweden, Finland, Hungary, Latvia, Lithuania, Malta and Slovenia)

- The joker is the EU-12 country where most of them are expected to increase milk production, but it is essential with huge investments in larger and more efficient dairy farms and improvement of milk quality.

The conclusion is that EU can only produce 50% of an expected quota increase of 6% until 2015

5. Dismantling measures

With the potential for increasing the milk production in the medium long term until the milk quota system will be dismantled in 2015 it is essential which measures are used to reach the goal:

- A hard landing, without gradually quota increases, either in 2010 or in 2015 isn’t a political acceptable solution because it can create significant price decreases that will affect many small and medium size producers in EU. Besides,the hard landing will create huge problems with the question about earlier investments in milk quota which overnight will be of no value.

- The most useful solution is to make a soft landing with gradual quota increases until 2015. This is political acceptable and it will dismantle the capitalization of the milk quotas until 2015.

- Due to the moderate expectations to the milk production increase until 2015 it is essential that the soft landing are combined with other measures like lowering the super levy, balancing the super levy on EU level, gradually decreasing of the super levy, suspension of the fat correction factor or differential calculation of the super levy. Cross border trade with milk quotas is no solution-it will only increase the capitalization. These supplementary measuresare important to give the right signals to most efficient milk producers and regions in EU.

6. Future scenarios 2015-2020

The situation after the abolishing of the MQS in 2015 is very dependant on a successful dismantling period from 2008 to 2015 improving the efficiency of the EU milk production.

Three scenarios is evaluated:

- Offensive: with an increase of 10-15% from 2015 to 2020, and EU will regain the leading position on the world market for dairy productions.
- Status quo: with stagnating production in the period and EU will keep up export of added value dairy products.
- Defensive: with decreasing milkproduction by 1-2% annually and the result is that EU will supply the home market and become a net importer of dairy products.

The defensive scenario is a worst-case situation where the increased import and the eliminating of the export refunds will hit the EU in a double sense. At the same time the milk production has not been developed necessary to be able to compete in more market oriented situation. It is not unrealistic but hopefully the offensive scenario will not only be wishful thinking. It is possible if the EU milk sector make the preparation already from 2008 to be efficient and especially the milk production in EU-12 is increasing due to investments in the region.

7. Competitiveness of the EU milk production

The transformation from a highly supported and protected sector to a sector in global competition makes it essential to focus on the cost of milk production in EU both between the respective EU countries and between EU and other major milk producing countries in the world. The problem is that there hardly are any comprehensive studies on the issue not even among the EU countries, this is a neglected area.

The report outlines some of the recent analysis on the cost of milk production where the findings are:

- The EU-15 countries have the highest production cost between 34 and 53 USS/100kg andonly UK is under this level.

- The EU-12 countries have significantly lower production cost and they are closer to the international level between 15 and 23 US$/100 kg.

- New Zealand and Australia has a cost level that is half the size of EU-15 between 15-17 US$/100 kg.

The cost of milk production is very important but other factors also has to be taken into account like:

  - Environmental regulations
  - Animal welfare
  - Competition from bio-fuel

Besides the external factors there will be a new challenge for the EU milk producers to:

- Increase investments in efficient production systems
- Higher yield per cow
- Lowering the replacement rate in the herd
- Decrease the export of live cattle
- Reduction of calves mortality
- Introduction of sex-selected sperm
- More grass based milk production

The milk production without the milk quota system will give new possibilities and new ways of optimizing the milk production in EU.

It is a huge change, which offers a lot of opportunities for EU to regain a strong and dynamic position in the global dairy market and also a huge challenge due to the need for capital and investments in more efficient dairy farm in all parts of EU. At the same time the political decisions shall be supporting this transformation to a market oriented system.

8. Outlook for milk production without quotas in Ireland

Viewed from the outside, the Irish milk production has in general the largest potential to expand the milk production when the milk quota system is dismantled. Among the EU-15 countries Ireland has the best climatic and natural conditions for low cost grass- based milk production. Some of the EU-12 countries have a larger potential but from a very low level, and both the milk production and dairy industry needs huge investments to expand the milk production significantly.

Ireland is along with Denmark and the Netherlands the major exporters of dairy products in EU relatively compared to the milk production ranging from 2/3 in Denmark and the Netherlands to more than 80% in Ireland. This means they have the capabilities to market the additional milk production. A SWOT analysis is an excellent tool to further evaluate the opportunities for the Irish milk production and dairy industry in a situation of gradually dismantling the quota system.

SWOT analysis of the Irish milk sector

Strengths	**Weaknesses**
-Long tradition for milk production -High quality raw milk -Fresh and sustainable -Low cost production -Grass-based milk production -Strong cooperatives -Consumer acceptance of the sector and the products -Political support to the sector -Important for the Irish economy	-Inefficient milk production structure -Seasonality - No efficient quota allocation system -Political priority of small dairy farmers -Old fashioned milk pricing system -Unfinished dairy structure -Dependence on intervention -Concentration of the dairy industry instead of diversification -Lack of capital in both the milk production and the dairy industry
Opportunities	**Threats**
-Strong global demand for dairy products -Relatively high world market prices -Dismantling of the quota system -EU can regain the dominance on the world market -Agriculture and milk production on market conditions	-Economic crisis and recessions -No WTO II agreement -Bio-fuel policies will increase the cost for the milk production -Political overreaction in relation to environmental regulations -New diseases -Pressure from the retail chains and discounters -Price volatility

Source: PM FOOD & DAIRY CONSULTING, Denmark

The strengths of the Irish dairy sector is unquestionable and has to be the basis for the future strategies and decision, but it is important always to question what can be done better or different. The main thing to keep in mind is the long and strong tradition for cooperatives and cooperation between dairy farmers and the dairy industry.

The opportunities are multifold and especially the increasing demand for dairy products globally and the relatively higher prices are positive and create the background for dismantling the milk quota system. Although, the dairy market is affected by the current crisis, the long-term positive development is expected to hold. The long-term trend of liberalization of the agricultural policies will also benefit the dairy farmers in EU by the higher returns from the market, although the future will bring a higher degree of price volatility.

There are also many threats like economic crisis as we are experiencing at the moment that decrease the short-term demand and depress the prices. The impact of the bio-fuel production can also increase the cost for the milk production if the policies don't change focus to second or third generation bio-energy. The future political regulations can restrict the possibilities to expand the milk production by implementing very strict environmental regulation. It is also important that the EU ministers of agriculture give the right signals to the milk producers by fixing a plan for dismantling the milk quota system and don't mix social and regional priorities with the market deregulations. A failure to reach a WTO II agreement will damage the dairy industry by uneven support reductions and limited market access. Finally, it is very important that the dairy industry is strong enough to resist the increasing pressure from the rapid expanding retail chains and discounters.

The weaknesses of Irish milk production and dairy industry is the important area to assess in relation to evaluate the possibilities to expand milk and dairy production. The relatively small dairy farm size is one of the major obstacles to expand milk production. Compared with the dairy structure in UK, Denmark and the Netherlands the Irish structure is 1/3 to 1/2 even though the grass-based milk production in its nature is related to economies of scale like in New Zealand. It is also significant that a large section of the Irish dairy farmers rely on secondary farming business to generate income – usually in beef production. This is not the case in Denmark, UK and the Netherlands where the majority is fully specialized dairy farmers. Unlike these countries Ireland has never implemented an efficient quota allocation system like in the other countries where there are quota exchange system with no limits and free trade of quotas. The limitations in Ireland in relation to quantities and regions have hindered a natural and economic rational structural development in spite of the supply management system. The seasonality of the milk production is both an advantage and a problem. In relation to production cost it is favorable, but in relation to the utilization of the processing capacity on the dairy plants and the possibility to produce value added products. A solution is to change the pricing system to be based on milk constituents and introduce a seasonal differentiated price. This combined with emerging of larger dairy farms will give the wanted response.

The dairy industry is also characterized by an unfinished structure with 3-4 large dairy companies that don't match the international competitors in relation to market power and investment level both in relation to research and development, branding and marketing. The Irish dairy industry is still depending on intervention – 30% for butter and 11% for SMP in the recent years, whereas the countries and companies to compare with are not dependent on the intervention system. Diversification seems to be a popular solution to the problems for the cooperative dairies in Ireland – for example onion and mushroom production, DIY, land and property assets, rural development and retired farmers. The only reply to this is: Keep to core business, invest and improve the performance all the time or loose the battle for the dairy consumers around the world.

The Irish dairies have to concentrate like in Denmark, Finland, Sweden, Norway and the Netherlands to be able to lift the huge task of securing the necessary capital to invest in product development and global marketing. In this relation the construction with a common export company, Irish Dairy Board, seems a bit out of date. The same arrangement was in place in Sweden, Denmark and the Netherlands 30 years ago, but has ever since been taken over by the dairy companies. Another and maybe more fruitful development would be to merge or create joint ventures with some of the top 20 dairy companies in the world both to secure capital, new technology and brands.

9. Conclusions

The dismantling of the EU milk quota system opens up new opportunities for the Irish milk production to expand the milk production in the short/medium and long term. The major obstacle is the structure in the milk production, and it essential to establish an efficient quota allocation system without restrictions, so the structure can improve in the dismantling period from 2008 to 2015. If this process is successfully initiated, Ireland has the potential to be one of the expanding milk production areas like several of the other North European countries. Seasonality, the major discussion subject in the last 30 years in Ireland can be solved when the farm structure is improved and the dairy farmers reacts on pricing systems due to the increased economic dependence on milk production.

The article is based on the report:
The EU without Milk Quotas – What is the Impact?
By Preben Mikkelsen, PM FOOD & DAIRY CONSULTING, Denmark. (April 2008)

Cost Inflation: Impact on Dairy Profits

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Summary

- Milk production costs have increased steadily over the last 20 years at 1 % per annum and much more rapidly (circa.5 % per annum) over the last 3 years due in part to a spike in energy related costs.
- The rate of increase in the variable costs of production has been almost twice the rate of increase in fixed costs.
- Milk price will be much more volatile in the future due to reduction in support mechanisms.
- Cost and price projections for 2009would indicate that the nominal margin in milk production will be the lowest for over 20 years.
- The medium to long tem outlook for milk price is still quite strong.
- The range in milk production costs at farm level is greater than the year-to-year variation in milk price.
- In order to determine the most appropriate response at farm level it is essential to benchmark your production costs against other producers.
- For low cost producers (<17c/l common cost) focusing on low cost grass based expansion opportunities available will yield the best return on effort.
- For high cost (>20c/l common cost) producers focusing on cost reduction technology will yield the best chance of increasing farm income.
- The primary factor influencing costs of milk production in Ireland is the proportion of the cow's diet from grazed grass.
- For farmers achieving average levels of grass utilisation, improving to the levels possible with good grassland management will have a bigger effect on profitability than the current drop in milk price

Cost inflation

The costs, output and profit per litre of milk production on the average Irish dairy farm for the last 18 years and the predicted costs and profit for 2008 and 2009 are shown in Table 1. Over the period 1990 – 2005 there has been a gradual and consistent increase of approximately 0.5% per year in overhead costs, 1.5% per year in direct costs leading to a combined increase of 1% per annum in total cost of production. Because of a spike in grain, energy and fertilizer prices in 2007/2008 there has been a significant increase in the rate of cost inflation over that period and it is likely that costs in 2008 will be approximately 17% higher than in 2005 which is equivalent to a 5%/annum increase in total cost over the last three years. At this stage it looks likely however that costs will fall back somewhat next year due to a fall in grain and energy related costs, but will remain well above 2007 levels.

Table 1: The costs output and profit per litre of milk produced since 1990 and the predicted margins for 2008 and 2009

Year	Direct costs	Overhead costs	Total costs	Gross Output	Net profit	Cost / Output Ratio
1990	8.34	8.21	16.55	27.7	11.17	0.6
1991	8.09	7.93	16.02	25.6	9.58	0.63
1992	8.27	7.8	16.07	27.4	11.65	0.59
1993	8.87	8.23	17.1	29.8	12.7	0.57
1994	9.36	7.86	17.22	29.6	12.41	0.58
1995	9.87	8.5	18.37	31.0	12.65	0.59
1996	9.84	8.63	18.47	30.0	11.53	0.62
1997	8.62	8.2	16.82	28.5	11.67	0.59
1998	9.12	8.3	17.42	29.3	11.88	0.59
1999	9.08	8.22	17.3	27.9	10.56	0.62
2000	8.83	8.65	17.49	29.5	12.01	0.59
2001	9.11	8.76	17.88	30.7	12.85	0.58
2002	9.63	8.56	18.19	28.5	10.27	0.64
2003	9.16	8.13	17.29	28.1	10.76	0.62
2004	8.89	8.76	17.65	29.4	11.72	0.6
2005	10.18	8.71	18.88	28.2	9.3	0.67
2006	10.71	9.2	19.7	26.7	7	0.74
2007	10.7	9.8	20.5	33.7	13.2	0.61
*2008**	*12.2*	*9.9*	*22.1*	*33.0*	*10.9*	*0.67*
*2009**	*11.7*	*10.0*	*21.7*	*27.0*	*5.3*	*0.80*

*Predicted costs and milk price for 2008 and 2009 based on current trends

All other data adapted from NFS

Milk price

Over the period 1990 – 2006 milk price remained relatively consistent varying marginally between 27 and 30 c/l. However, since 2006, with the decoupling of dairy support prices there has been a new era of substantially greater fluctuation in milk price driven by commodity price fluctuations on world markets. This led to a very significant increase in milk price in 2007 which to a large extent was maintained for a large 2008, however this is falling rapidly. Current indications are that the outlook for 2009 milk price is poor and based on current commodity prices is likely to be at the lower end of the range in which it traditionally fluctuated within. However, most commodity markets worldwide are fluctuating rapidly in the current volatile global economic climate and accurate predictions of short to medium term prices are difficult. The medium to long term outlook for milk prices is still very good as growth in demand is well in excess of potential supply growth from low cost producers. The increased demand will have to be supplied, in part at least, by high cost producers who will require a relatively high price to be viable.

Producer margin

The combined effect of the significant increase in cost inflation over the last 3 years and the low milk price prediction for 2009 would suggest that milk producer's margins next year will be the worst for over 20 years. There is significant variation in the margin attained by milk producers (**Table 2**) which is driven by a large range in costs of production at farm level, and in the value of milk sold due mostly to higher milk composition. Most of the variation in variable costs of production can be explained by the costs associated with purchased feed. Low and average profit producers purchased more feed than high profit producers even though stocking rate was lower and milk yield per cow was similar which would imply they were utilising less grass even though fertiliser inputs were similar. The main variables that influenced fixed cost on farms were the level of investment in depreciating assets such as buildings and machinery and the operating costs associated with these depreciating assets none of which are associated with cows grazing grass.

Table 2: The 2007 output, costs and profit of the average, highest and lowest margin producers as measured by the dairy profit monitor

	Top 10%	Average	Lowest 10%
Gross output (c/l)	36.36	34.28	31.38
Stocking rate (LU/ha)	2.06	1.99	1.78
Yield (litres/cow)	5327	5328	5252
Fat %	3.92	3.87	3.78
Protein %	3.47	3.40	3.33
Costs of production (c/l)			
Feed	2.11	2.97	4.43
Fertiliser	1.55	1.64	1.74
Total variable costs	7.47	8.86	10.84
Machinery	0.87	1.35	1.90
Depreciation	1.21	1.76	2.20
Total Fixed costs	6.24	9.22	11.87
Common costs	13.7	18.1	22.7
Margin (c/l)	**21.6**	**16.3**	**10.5**

High profit systems

High profit farmers achieved a higher proportion of their cows' diet from grazed grass and this helped to reduce both variable and fixed costs and also to increase the value of milk through higher composition. This relationship between grass dietary proportion and costs of milk production is a worldwide effect (figure 1) where costs decline in all countries as the proportion of grass increases in the diet. In the zone of the graph of interest to Irish dairy farmers where the grass proportion is greater than 50% of the diet, increasing the proportion of the diet from grass by 10% reduces total milk production costs by approximately 4 c/l even though the feed costs are only reduced by about 2 c/l. Both fixed and variable costs go up as feeds other than grass are included in the diet. This highlights the danger of marginal analysis of feed costs.

Figure 1. Relationship between costs of production and proportion of grass in the diet

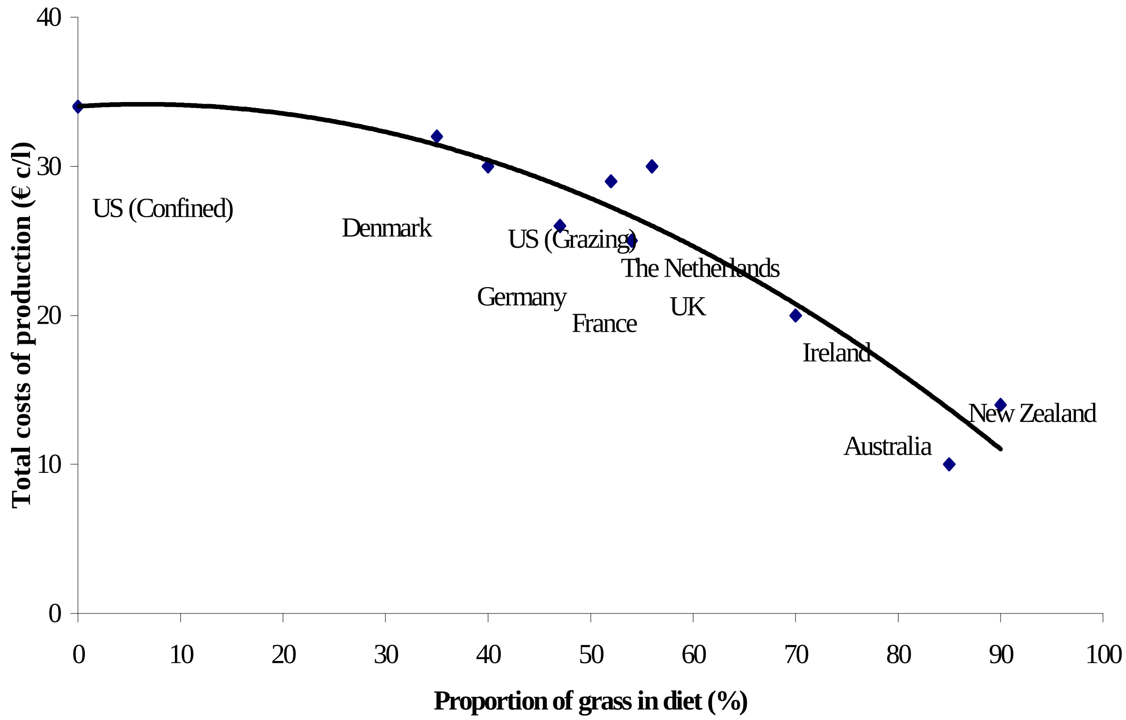


Table 3 details the productivity and profitability of the National Farm Survey (NFS) average specialist dairy farm which spreads 170 kg N to grow 11.5 t grass DM/ha but only utilises 56% of the grass grown and compensates for the poor utilisation by feeding over 700 kg concentrate/cow or almost 1.5 t concentrate /ha and is compared to three other farm systems all operating at similar milk price. The second system describes the farm but with grass utilisation increased to 72% through better grass management and extending the grazing season, the net effect would be an immediate increase in profitability of almost €350/ha due to reduction in variable costs, particularly N to grow grass and concentrate to substitute for grass wasted. The other two systems describe the same farm but with technology levels on the farm operating to Moorepark and Ballyhaise standards both of which operate at high stocking rates but both achieving high grass growth and very high grass utilisation. While there is a marginal difference (€235/ha) between the sites due to the length of the grass growing season the effect of the increased grass utilised per cow and per hectare in comparison to the average farm is worth over €1,800/ha.

Table 3: The productivity and profitability of four farmers with varying stocking rate, grass production and utilisation

	NFS Average	NFS Increased grass utilisation	Ballyhaise	Moorepark
Cows/ha	1.9	1.9	2.9	2.8
MS/ha	650	650	1250	1257
MS/cow	342	342	430	447
T Feed required/ha	6.4	7.2	13.7	13.4
Grass Grown (t/ha)	11.5	10.0	15	15.7
N applied (kg/ha)	170	90	240	246
Grass utilisation (%)	56	72	82	85
Concentrate (kg/cow)	713	100	500	280
Profit €/Ha @ 28 c/l	650	999	2,479	2,714

Expansion

Table 4 examines the effect of milk production costs and different levels of expansion on the profitability of an average dairy farm at a base milk price of 28 c/l. The expansion costs include full labour costs (5.5 c/l) capital depreciation and interest on capital costs for the extra cows and facilities required. Costs also include the rental of extra land (25 ha) for the higher level of expansion. For medium and low cost producers, replacing non dairy stock with dairy cows will significantly increase profitability. While the impact on profitability over the 10 year term may seem relatively small, it has to be considered that full costs were included in the expansion and in many cases the benefits will be greatly improved where labour and housing requirement would be supplied from the redeployment of existing resources or increasing labour productivity by operating simpler farm systems concentrating on milk production.

Table 4. Effect of production costs and level of expansion on profitability of a 52 ha dairy farm (including full labour and capital costs)

Costs of production	Level of expansion		
	no expansion	60%	107%
Low cost	€33,184	€36,204	€35,560
Medium cost	€29,575	€31,793	€28,924
High cost	€26,298	€24,081	€17,474

60% replacing beef cattle with dairy cattle

107 %, replacing beef cattle with dairy cattle and renting extra land for grazing dairy cows

Conclusions

Costs of milk production in Ireland are continuously increasing at an accelerating rate over the last 3 years, and the milk price received by Irish dairy farmers is much more volatile than before, since decoupling of EU supports in the mid-term review. Present indications are that the margin in milk production in 2009 will be low.

Two strategies available for farmers to overcome this are to increase output or to reduce costs.

(1) Farmers with high milk production costs should not consider expansion and have the greatest potential benefit from cost control.

(2) Farmers with low milk production cost will achieve a good return on investment from increasing output using grass based systems with low capital investment in depreciating assets.

My Strategy to Controlling Farm Costs

Shane Fitzgerald, Ballynoe, Co. Cork

Summary

Grass Budgeting

Walk the farm weekly, match grass supply to demand. As a result of walking the farm and measuring the grass I have cut my fertiliser and meal costs by **€62** per cow for 2008. A huge saving considering the increase in the cost of feed and fertiliser during the year.

Fertiliser

- Nitrogen application in the summer is based on growth rates, demand and cover per cow
- Fertiliser cost have decreased by €19 per cow for 2008 compared with 2007
- Diluted slurry is used instead of chemical fertiliser after grazing wherever possible.

Meal

- Cows out to grass fulltime as they calve in February
- On/off grazing used in wet weather
- Predicted to feed 170kgs less meal per cow in 2008, at a cost of €250/ton, the savings amount to €43 per cow.

Facilities

- Low cost housing must be considered e.g outwintering pads, lined lagoons. Costs €580/cow excl grant, conventional housing = €2,500/cow

Breeding

- Breed the right type of cow for my grass based system
- Good fertility and compact calving is essential to maximise the amount of milk solids produced from grass.

Reseeding

- Enables the farm to grow more of our cheapest feed – grass, the key to profitable dairying.

Financial

- Complete a Profit Monitor annually to identify your strengths and weaknesses

  2007 Common Costs = €13.36c/lt Common Profit = €23.77ct/lt

Introduction

I am living 3 miles outside a small village called Ballynoe which is situated 10 miles either side of Midleton and Fermoy. After finishing my leaving cert in 1996 I went on to complete my Green Cert at Moorepark which culminated in doing my farm placement in Holland in March 1999.

My father Jerry started farming the home farm of 30Ha in 1974. I took over the running of the farm in April 2008 farming 70Ha (53.8 owned) and milking 120 spring calving cows, filling a quota of 704,630 litres.

Development of the farm in the last 10 years:

- 1999 switched from autumn to spring calving herd.
- 2000 build a new 20 unit Herringbone milking parlour
- 2002 started crossbreeding
- 2003 began grass measuring and budgeting
- 2007 built outdoor wintering pad with lined lagoon

Recent Production

Table 1: Production over the last 2 Years

	Fat	Protein	Milk Solids/Ha	Kg MS/Cow
2007	4.21	3.55	1012kg/ha	455
2008	4.30*	3.73*	985kg/ha*	471*

* = Predicted values

Within the next three years I hope to milk 180 cows and increase my output/ha to 1350kg MS/ha while keeping costs under €2/kg MS.

Key Factors in Controlling My Costs

Grass Budgeting

In 2003 I went on an Irish Grassland Association trip to New Zealand. From this experience alone I learned that on a low milk price and increasing input costs that a grass based system was the way forward. On my return I started grass measuring with the help of the Dairymis discussion group under the guidance of Pat Dillon initially and now Michael O'Donovan, this has helped me harness my skills of grass budgeting. For the last two years I have been trying to grow grass to match demand and build covers at certain times of the year.

Grass Targets

Table 2: Grassland Management Targets

Dates	Actions
10th October	**Started closing paddocks**
10th November	66% of farm closed
1st December	Closing cover of 550Kgs DM/Ha
1st Week of February	Calved cows to grass full time
1st March	30% of grazing platform grazed
1st April	Finish 1st rotation
May-July	Maintain cover per cow at 160kgs DM
August	Build covers for the autumn

These targets (Table 2) are essential for me to make this low cost system work. This grass is my key to keeping feed costs down.

Cows are out to grass as they calve which is achievable through excellent farm roadways and multiple access points to paddocks. This year no silage was fed in the spring to calved cows as on-off grazing was used, in wet weather grazing for 3 hours after morning and evening milking in bad weather, then cows were housed and no silage was fed while indoors.

Baled silage was introduced the 1st week of November to reduce grass demand and enable cows to stay out until 24th November full time.

In the last year while using my grass budgeting I will spread fertiliser only when it is required. Also from the middle of April onwards I stock my grazing platform to at least 4 cows/ha. Using excess ground for reseeding and 1st cut silage purposes. This stocking rate means that I can utilise every blade of grass at peak growth. It is essential to walk the farm weekly or twice weekly if growth rates are high.

Fertiliser for 2008

1st Week of February: The first $^{1}/_{3}$ of the farm to be grazed got nothing before grazing and receives 3,000gls diluted slurry post grazing, second $^{1}/_{3}$ of farm that would be grazed got 23 units of Urea/acre and the final $^{1}/_{3}$ of farm that will be grazed end March/early April got 3,000gla slurry per acre.

1st Week of March: Blanket spread 40 units of Urea on all grazing ground.

1st Week of April: Blanket spread 40 units of Urea on all grazing ground. Silage ground gets 70units of Nitrogen plus 3,000gls of slurry.

May: Stocking rate at 4cows/ha, following grazing with 10 to 25 units of Urea (depending on grass cover) with slurry being used instead of Nitrogen on some paddocks.

June: Silage ground back in grazing platform so stocking rate down to 2.5Lu/ha and I will follow cows with 15-20 units of Nitrogen.

July: Start of month, some ground got 10 units of CAN per acre or diluted slurry, majority got no fertiliser.

August: No fertiliser application, reseed ground back in so stocking rate is down to 2.1/Ha

September: Blanket application of 40 units of Urea to build covers.

Whenever possible especially in the spring, fertiliser is replaced with 3,000gals of diluted slurry. This system had a huge saving on my fertiliser costs for 2008 as my fertiliser cost for 2007 was too high at 2.03cent per litre. By reducing the rates of fertiliser application in 2008 I have reduced my fertiliser costs by €19 per cow even though the price of fertiliser rose dramatically this year. This equates to a total saving of €2,280 on my fertiliser bill for the year.

Meal Feeding

In recent years meal feeding has been replaced with quality spring grass. In 2008 I fed 4kgs for February and 3kgs for March with no meal being fed from the 1st April. I reintroduced 2kgs of meal from the 1st September due to poor weather conditions. As you can see from the table below the concentrate being fed to the cows in a two year period has reduced dramatically.

Table 3: Level of Concentrate Fed over Last 3 Years

Year	Concentrate Kgs/Cow
2006	1,000
2007	500
2008	330 (est)

At a cost of €250/tonne, this 170kgs reduction in meal per cow will save me €43 per cow for 2008 or €5,160 for 120 cows.

Facilities

In 2006 we decided that extra accommodation was needed. After looking at several options it was decided to go down the road of building an outdoor wintering pad and lined lagoon. Not alone did we think it was the most cost effective method of building but also was extremely healthy on animals.

Planning was obtained in March 2007, building commenced in June and an outdoor pad to accommodate 150 cows plus slurry storage of 500,000 gallons was put in place. The total costs of the pad for 150 cows and 500,000 gallons slurry storage was €100,000 (or €580 per cow) excluding VAT and no grant. Conventional housing for 150 cows would have cost €375,000 (€2,500/cow). By building an outdoor wintering pad with lined lagoon I have saved on capital costs of €275,000. This is a huge saving on fixed costs plus my outdoor pad is more flexible as the shed would only be used for December/January whereas the pad is used for calving cows until March/April and then used for bulling heifers.

There is a cost in replacing wood chippings each year but very little straw is required now as a lot of cows calve on pad which is a saving, also I have made savings through less cow lameness, injury etc, cows are healthier.

Breeding

In 2001 we felt a change was needed as regards breeding, we had a Holstein herd from an autumn calving background with fertility being a major issue. We decided to go down the New Zealand friesian route and in the last seven years several types of crossbreds have been used on the farm. New Zealand friesian, Norwegian Red, Swedish Red and Jersey have all been used to huge effect. Our conception rate to 1st service had gone from 35% to over 65% in the last seven years. Infertility has dropped from high twenties to 7% this year. Protein has jumped massively in the last 3 years from 3.35% in 2005 to a predicted 3.73% this year.

Table 4: Genetic Merit of Cows and Calves in the Herd

	EBI (€)	**Milk Sub Index €**	**Fertility Sub Index €**
Whole Herd	€97	€40	€50
2008 Calves	€110	€54	€46

2008	-	21 day submission rate	=	91%
2008	-	Conception to 1st service	=	65%
2008	-	Six week calving rate	=	84%
2008	-	Empty rate	=	7%

This I feel justifies my breeding policy, breeding the correct cow to produce as much milk as possible off grass. While New Zealand friesian is my favourite animal I do feel there is also a place for the Norwegian and Jersey breed in the herd. 84% of the herd this year calved in six weeks. Excellent fertility is essential for the system to work as you need cows calved compactly to turn this grass into milk solids, the cheapest way to produce milk. Also with good fertility my replacement costs will be lower and I will have breeding stock to sell which is a major contributor to my gross output.

Breeding Strategy

My heat observation starts on the 19th March. All the cows are tail painted and breeding begins on the 24th April.

Any cows that showed no heat in the previous month and over 40 days calved will receive 2cc Estrumate to bring them into heat. Tail painting is applied at least once a week and A.I is continued for 9 weeks before a stock bull is left off for 5 weeks.

Heifers are brought into stand off pad on 17th April and are A.I'd for 10 days and the rest are given 2cc's Estrumate and then A.I'd. After that a Norwegian Red stock bull is left off with them. This gives me more time to concentrate on the cows. All animals are then scanned in October. A lot of time and effort goes into breeding but if the results come good at the end of the day it certainly is well worth it and a huge key to controlling my costs.

Reseeding

"A complete waste of time spreading fertiliser on old pasture". A percentage of the farm is reseeded with Moorepark recommended varieties in the month of April. New grass reseed is essential if one wants to have grass early in the spring, I know that every extra day I can get my cows out in the spring I will be saving €2.70/cow/day. With a low stocking rate I find clover is beneficial but as stocking rate increases it becomes more of a hindrance due to clover not growing in spring or autumn.

Financial

Completion of a Profit Monitor is essential to identify your strengths and weaknesses.

Table 5: Profit Monitor Analysis For 2007

	My Cost Per Litre	**Top 10% Spring Calvers Cost Per Litre**
Co-op Milk Price	36.9	34.91
Total Dairy Output	37.12	35.45
Feed	1.73	2.15
Fertiliser	2.03	1.51
Vet	1.30	0.81
A.I.	0.31	0.49
Contractor	0.66	1.28
Other Variable Costs	1.81	1.43
Machinery	1.85	1.17
Car, ESB, Phone	0.99	1.19
Depreciation	0.84	1.47
Other Fixed Costs	1.84	1.66
Common Costs	13.36	13.16
Common Profit	23.77	22.28

My common costs amount to 13.36 cent per litre for 2007. If I can reduce my common costs by even 1cent per litre I would reduce my total common costs by €7,046.00.

Herd Health & Veterinary

An extensive vaccination programme is carried out on the farm each year i.e. Lepto, Salmonella, BVD. I feel strongly that prevention is better than the cure. It leads to a far healthier animal and certainly a less stressed farmer. This also gives me an animal that calves down in 6 weeks and is more likely to milk her 300 days as a result. Time spent treating sick animals, replacing sick animals, high cell count cows, infertile cows etc can be a huge cost on a dairy herd. A closed herd is maintained as much as possible.

Current SCC on the farm is less than 100,000 with just 17 cases of mastitis recorded on the farm this year. Management I believe has a huge bearing on this low number i.e. regular service of the machine, change liners twice a year, general cleanliness around the parlour, correct teat spraying, using recommended levels of machine cleaning chemicals, milker wearing gloves and generally applying good hygiene and routine while milking the cows.

Calf Rearing

Labour can be a huge cost while rearing calves on a dairy farm. My system is simple and labour efficient. Feed twice daily for 1st week in groups of 10. Males are then sold with females moved to a calf rearing unit, consisting of open straw bed sheds with access to sheltered paddock. From 1 week old these calves will receive 1 gallon of whole milk once a day plus concentrates until 8 weeks of age and then get excellent quality grass for remainder of year with no concentrates.

Conclusion

We have been told to expect large fluctuations in milk prices going forward, anything from 25c/lt to 35c/lt. My goal is to put in place a low cost system that will leave a margin even in periods of low milk price.

Grass is the key to this system, but you must be able to grow enough of it, measure, budget and utilise it. Having the right type of cow is essential for this system and fertility is paramount for the system to succeed.

This year alone by measuring grass and having the right type of cows I am predicted to increase my protein by 0.18% and increase my milk solids by 16kgs per cow while at the same time cutting my fertiliser costs by €19 per cow and meals by €43 per cow.

For the two input costs alone my savings will be €62 per cow or €7440 for the herd of 120 cows. I spend in 50 hours per year measuring grass, this gives me a return of €149 per hour.

Complete a Profit Monitor today and see where you stand!

Acknowledgement

Back in 1974 my father Jerry was given a green field site and told to farm it. In the last 34 years he has seen many highs and lows in dairy farming i.e. high interest in early 80’s to the high milk price of 2007.

Since I started farming at home in 1996 he has been a huge influence on where I and more importantly the farm is presently. He has always been forward thinking in his way. This is shown by the building of a top of the range milking parlour in 2000 and more significantly the building of a lined lagoon and outdoor wintering pad in 2007. In April 2008 the farm was signed over and I only hope that I can be half the farmer that this man is.

To my mother Noreen, who is also a huge part of the setup at home from cooking the meals to coming down on a cold spring morning to give a hand to milk freshly calved heifers and for years doing the bookwork for my father.

I have often been told but will never fully understand what they went through in them early years to get the farm to where it is now. To both I am eternally grateful.

My Cost Effective Farm Expansion Plans

Michael & Shirley Bateman, Knockaneroe, Crookstown, Co. Cork

Summary

A farming business not going forward is going backwards.

It is my opinion that after 20 years of cost cutting and static prices, with the medium to long term outlook for price in the 30 to 33 cent bracket, the way forward has to be through increased output in a low cost system with expansion costs kept to a minimum

I have expanded:-

- **Land Base**

  From 48 ha to farming 165 adjusted ha

  Through long term leasing and contract rearing

- **Stock Numbers**

  From 90 cows 2005 to 235 in 2008 and target to milk 350 within 5 years

- **Quota**

  590,000 L to 1.22 Million L currently with a target of 1.9 million L

  (160 tonnes milk solids) within 5 years

- Cost of Capital Investment €440,000

  €1875 per cow, I hope to drop this figure to €1480 per cow by 5 years time

  I didn’t stay within Budget Cash flow is tight when expanding (a lot of money tied up in stock) It takes some time to get output up to full swing

- Profitability

  The driving force has to be net profit

  Net profit 4 years ago (15 cent per litre) €88K

  Target net profit in 5 years time (9.5 c/l) €170k

  If I did no expansion profit in 5, years time (8.25 c/l) €49k

When your expanding your mind is really opened up , you run your farm more like a business ,and you can really enjoy the challenge

Land Base

I came home from Ag College in 1989. The home farm at that stage consisted of 80 ha; there was myself and two brothers going farming, so a conscious decision was made to expand through the purchase of land and quota. The idea was to have three milking platforms. This has served the Bateman family very well over the years with increasing land values boosting our net worth very nicely.

By 2004, my portion was built up to 65 ha, of which 48 ha at Crookstown was my milking platform. At this stage, I was still farming in Templemartin with my brother Barry, with the land in Crookstown used for rearing our replacements and growing maize silage. In December 04, a neighbour in Crookstown, Jack Murphy approached me about leasing his land long term. There was 40 ha in this farm, it was all in tillage and I took it over in the spring of 2005. In the spring of 2008 another neighbour Tim Murphy put his farm up for long term lease this farm had 26 ha. Finally I had been getting my heifers contract reared off farm but in August Seamus Corkery who is also boundsing me said he would contract rear the heifers on his farm of 62 ha. So now, the farm consists of a milking platform of 110 adjusted ha and a further 62 ha for rearing heifers.

Cost wise, buying a farm is expensive, it take’s a lot of free cash to service the loans but you get the up side of land price appreciation. Leasing land is a lot less demanding on free cash, but there is a small bit of the element of dead money in it. Long term in the future I would hope to increase the amount of land owned and maybe setup a second milking platform

Quota

Our 1983 quota was 630,000 L, as I have already said we purchased land and quota right through the late 80s and into the nineties. My portion in 2005 was 590,000 L. In 2005, I met a man looking for a milk Production Partnership (MPP) and as I had the land base, we made an agreement. So now (2008) I am up to 1.22 million L. Going forward I will not pay over the top for Quota, I did not bid for quota in the last exchange. I hope quotas will go sooner rather than later but I will buy quota if I thought it was an obstacle to my farm business in the future. As regard cost effective expansion I find the question of what price to pay for quota as one of the hardest to answer for me. At the moment, it is in the 20-cent bracket but it is different for everyone.

Stock Numbers

In 2005 when I moved out of the home farm, I took my portion of the stock with me, which amounted to 75 cows, 46 in calf heifers & 57 calves. My partner brought 80 cows to the table so we milked 175 cows in 2006. In 2007, we bought a further 20 in calf heifers and increased to 210 cows. This year we milked 235 cows.

Over the last couple of years, we have kept as much young stock as possible and this year we have 120 in calf heifers and 100 weanlings so hopefully we will milk 300 cows next year. Heading up to 350 cows over the next couple of years, I will also continue to put as much young stock on the ground as possible.

I see it as very important to have a large number of heifers as I have being burnt in two ways over the last number of years, the first one being animal health, I had major problems with IBR in 2006 due to the mixing of the two herds. Also increasing stock numbers at the same time as developing the farm business puts a big drain on cash flow. Therefore, my strong advice to anyone who is thinking of expanding is to put large numbers of the right type of stock on the ground as quickly as possible.

Capital Investment

Table 1: Farm setup costs

	NET cost €	€ / COW		€ / HA
Parlour	117,000	498		1035
Slab	17,500	74		155
Pad – Easy feed	59,000	251		522
Slurry Tank (E)	35,000	148		321
3 Under passes	75,000	319		664
Fencing	5,000	21		44
Water	20,000	85		177
Reseeding	14,240	60		126
3K roadways	30,000	128	€10 / M	265
Calf shed	30,000	128		265
Extra easy feed (E)	10,000	42		88
Misc.	30,000	128		265
Total	**440,740**	**1,875**		**3,935**

E = Estimated

Four years ago, we had a disused six-unit parlour, silage pit for 500 tonnes, 85 cubicles not suitable for large cows, slurry storage for sixty thousand gallons. The farm was in four blocks, no roadways, 25 ha of which was paddocked, the water system was not suitable for cows and 60% of the farm was in stubble.

In 2005, we reseeded the stubble using a disc harrow and one pass.

For roadways, we dug rock on the farm and just topped it with a light layer of ¾ down. This worked out at a cost of €10 per linear meter for just over 3km.

We will have to improve 400 meters of this near the parlour, it has not held up well in the wet summer and we have too many lame cows.

That summer we Built a 28 unit simple basic parlour. This includes plant, feeders, meal bin, handling facilities, new bulk tank (21000 litres), and electricity and also shed erection & concrete work, which we mostly did ourselves.

That winter we out wintered on kale and the next winter we out wintered on fodder beet. In the autumn of 2005, we built wintering pads for 240 cows. My comment on wintering on crops is that it is a very cheap way of wintering cows but you certainly need a place to take them off to. I did not have this in 05 or 06 and it was not good for man or beast in wet weather, but in dry weather it was a great place to be and the cattle did great. This year I will give it one more go, I have kale in a paddock beside the yard and the cows will get the silage in the yard and be taken off when the weather is wet. I also feel that this will be a release valve for the pads and that we might get away with using fewer chippings.

The major investment on farm has been the underpasses. We put in three for a cost of €75,000 and even if it were double it would still have been worth it.

I am very much hoping that most of the capital has been spent (€440,000), and I have gone very much low cost. I could not justify a whole lot more from the point of view of profitability or capital tied up in buildings for an 80-day winter, or any more in the parlour to extract the same amount of milk.

My aim going forward is to increase output to spread these costs across more litres/cows I am hoping to bring the per cow figure down to about €1,430 = €500,000 / 350cows

Cash Flow

I would just like to make a few comments on cash flow in relation to cost effective expansion

1. You will never stay within budget
2. You need to think big to allow for further expansion
3. Increasing stock numbers really eats into cash flow i.e. by the middle of next year I will be up 150 cows, 70 heifers and 70 calves that's €250k + that comes out of net profit that the bank will probably never see
4. Profit is never as good as you would like it to be, for various reasons, like herd health, poor fertility, high labour. Things slip because your eye is on a different ball.
5. There is a delay in time from when you spend money until you get a return and that is always bigger than you first thought

Should you do all the setup before you start milking? I would think so but it is hard to justify it especially when you fill your quota each year.

Profitability

Four years ago, I was in a very settled system, ten years of cutting costs and fine-tuning the small things around the edges, profits were top class in terms of cent per litre.

Enter an expansion phase, profits fall, cost per litre deteriorate badly but the big picture that drive's me is that in the medium to long term there is potential for a large increase in net profit.

Table 2: Profitability of the farm in 2004 and in 2014 with or without expansion

	2004	2014	2014
No of cows	98	98	350
Gross farm output	€201,574	€210,150	€649,834
EXPENSES			
Variable	€41,370	€50,235	€151,725
Lease charges	€2,000	€2,000	€59,660
Hired labour	€40,000	€65,000	€111,000
other fixed	€29,775	€44,095	€156,610
NET FARM PROFIT	**€88,430**	**€48,820**	**€170,839**

Mindset

My cost effective mindset.

Five years ago, I was really enjoying farming but maybe I was not as focused as I could have been on how to grow my business and get free cash out. Expansion has really opened my mind in terms of needing to hit targets, the need for budgets, thinking long term and working with research.

My conclusion

Expansion is well worthwhile in terms of personal achievement and hopefully improving the profitability of the business. It will not be with out its trials and tribulations along the way. It would be very hard to do major expansion without going the low cost route. However, when you get high output and low cost I think you have a winning formula.

Control of Infectious Diseases in Irish Dairy Herds

***Ríona Sayers, Herd Health Research Officer, Teagasc, Moorepark*.**

Summary

- Non-regulated Infectious diseases such as BVD, IBR, Johnes Disease and Leptospirosis are resulting in significant economic losses on Irish dairy farms e.g. BVD alone in a naïve herd can result in calf losses of 35% through peri-natal mortality and culling of persistently infected animals.
- The impact of such diseases can be reduced by implementing an on-farm health plan incorporating biosecurity, diagnostic testing and strategic vaccination.
- A national survey of Irish dairy farmers indicates that over 70% of Irish dairy farmers consider biosecurity important in minimizing disease introduction and spread. However over 53%, stated that a lack of information prevents them from implementing biosecurity.
- Approximately 60% of dairy farmers surveyed indicated that they would voluntarily join a cattle health scheme combining biosecurity, vaccination and diagnostic testing and would pay a premium price for cattle from such a scheme.
- Greater awareness of infectious disease control amongst dairy farmers and implementation of the combined approach of biosecurity, diagnostic testing and vaccination will lead to reduced national prevalence of economically relevant infectious diseases.

Introduction

Irish dairy farmers are moving into an unsupported and unrestricted market, where milk production systems have to operate at optimal efficiency in order to withstand milk price fluctuations (O'Donnell et al., 2008). For years now, the merits of grassland management, nutritional management and management of fertility on dairy farms have been extensively promoted. The management of animal health, however, has been neglected, and it is an area that impacts significantly on the profitability of dairy farms. Diseased animals perform sub-optimally and decrease on-farm efficiency and profitability through waste feed, labour and veterinary costs. Global markets are critically important to the Irish dairy industry as approximately 85% of Irish dairy products are exported annually. Animal health is an important contributor to the international competitiveness of Irish dairy products, both as a result of the impact of animal disease on product quality, and because of the special importance of animal health in international trade. Ireland needs to move towards on-farm health planning as a means of maintaining market share, as well as improving productivity and competitiveness.

Herd health programmes employ a combination of biosecurity, vaccination and diagnostics to determine the health status of a herd (Villarroel et al., 2007). The health profile of a dairy herd will determine its success in terms of milk production, reproductive status and growth rates i.e. the key aspects in a successful dairying operation. In the past, farm health planning and biosecurity have been imposed on Irish dairy farmers through TB and brucellosis eradication schemes; voluntary practice has never been promoted nor encouraged. However, biosecurity practices are now becoming substantial components of modern farming (Ortiz-Pelaez, 2006) and as all herds are impacted by infectious disease, all are likely to benefit from the preparation and implementation of a biosecurity/herd health plan (Maunsel & Donovan, 2008). Many EU and non-EU countries (Netherlands, GD Animal Health Services; UK, CheSC Scheme; Australia, Animal Health Australia) are now implementing herd health programmes (More, 2008). These programmes utilise testing of milk samples in centralised laboratories in order to routinely screen herds, monitor their disease status, and promote implementation of appropriate biosecurity strategies. With the increasing prevalence of non-regulated diseases such as Bovine Viral Diarrhoea (BVD) and Infectious Bovine Rhinotracheitis (IBR) in Ireland, dairy farmers will need to take such practices on board in order to maintain competitiveness.

Case Study Showing the Economic Impact

The economic impact of non-regulated infectious diseases in Ireland can be clearly demonstrated by examining the effects Bovine Viral Diarrhoea (BVD) can have in a naïve herd. A total of 47 heifers were served in Moorepark between 16th November 2007 and 23rd February 2008 (14-week breeding season) to yield autumn calves in 2008. Poor fertility was noted during the breeding season (Table 1) with conception rates to first service well below target at 48.9%. Total number of services over the breeding period was 88, yielding 2.1 services per conception, again below target. A total of six heifers did not conceive yielding an empty rate of 12.8% (Table 1). As part of an on-going BVD control programme in Moorepark, all autumn in-calf heifers were tested for BVD virus in August 2008 (n=41). All tested negative for BVD virus. The heifers began calving down on 20th August 2008. Of the 41 heifers, 14 yielded calves persistently infected with BVD, yielding a PI rate of 35%, and an additional 4 calves either stillborn or dead within one week of birth. Outbreaks of both calf scour and calf pneumonia were recorded in the calf population within 3 weeks of the start of calving. Based on the clinical picture recorded in this group of naïve animals, the overall cost of a BVD outbreak in a similar herd of naïve animals in terms calf mortality, calf morbidity and PI culling alone is estimated at approximately €9000 per 100 cow herd. Although it was not possible to quantify the exact contribution of BVD to the poor fertility parameters recorded in this group of heifers due to the unknown BVD status of previous autumn calving groups on the farm, it is worth pointing out that such a fertility picture in a 100-cow spring calving herd would result losses of €19500 (Table 1).

Table 1: Potential financial loss due to a BVD outbreak in a naïve 100-cow herd

Calf-associated factors	**Actual**	**Target**	**Cost per 100 cow herd**
Direct PI costs			
General calf health			
	€101.25	€11.30	**€8995**
Fertility Parameters	**Actual**	**Target** **(Mee et al., 1999)**	**Cost per 100 cow herd**
Conception rate to first service	48.9%	>60%	€6400
Serves per conception	2.1	<1.5	€2400
% empty	13%	<5%	€10700
		Total	**€19500**

Biosecurity –Why important

Biosecurity is the single most important contributor to the prevention of infectious diseases and subsequent losses on a farm. Biosecurity in its simplest form means the implementation of measures to prevent the introduction and spread of infectious diseases (Gunn et al., 2008; Hoe & Ruegg, 2006). It can be applied at a national level where measures are employed to prevent the introduction of a disease into a country. Prominent examples of this would be the measures employed to keep diseases such as foot and mouth and rabies out of Ireland. Biosecurity can also be applied at farm level, in order to prevent the introduction and spread of an infectious disease onto an individual farm. The higher the level of a particular disease in a country (prevalence of a disease), the stricter the biosecurity measures required to reduce the risk of disease introduction. Infectious disease agents currently impacting on Irish dairy farms include;

- Bovine Viral Diarrhoea Virus (BVDv),
- Infectious Bovine Rhinotracheitis (IBR),

- *Salmonella Dublin,*
- *Leptospira hardjo,*
- Johnes Disease caused by *Mycobacterium avium* subspecies paratuberculosis,
- *Neospora caninum,* and,
- *Mycoplasma bovis*

Implementation of a strict closed herd policy is a critical component of disease control (Van Schaik, 2001). A closed herd policy (i.e. no cattle movement onto the farm, including bulls) combined with on-farm biosecurity measures such as stock and disease-proof boundaries (3 meter gap between neighbouring farms to prevent nose to nose contact), footbaths, restriction of visitors, disinfected veterinary equipment and single-use disposable needles, will optimise protection against the introduction of infectious diseases onto a farm. If feasible, a closed herd policy should be the primary biosecurity measure implemented.

However a recent Teagasc survey indicated that 54.5% of farmers surveyed intend expanding their dairy enterprises over the next five years, therefore a closed herd policy may be an unrealistic goal on many farms. In order to minimise disease risk when purchasing, therefore, the following biosecurity measures can be employed:

- Animals should be purchased from a single source if possible.
- Data on the health history of the source herd, the individual animals to be purchased and their vaccination status should be requested.
- All newly purchased animals including bulls should be quarantined correctly i.e. isolated for at least 30 days in an area that is at least three metres from other cattle groups, with no sharing of feed or water troughs and no mixing of dung and urine. Using an isolated paddock is an ideal solution to avoid problems with indoor quarantine. Animals from different source herds should be quarantined separately.
- On day 21 of the quarantine period, newly purchased animals should be tested for BVD virus and antibodies against IBR and Leptospira. If economically feasible and if previous health history highlights the need, newly purchased animals should be tested for Johnes Disease, Salmonellosis, Neosporosis and *Mycoplasma bovis*.
- All new purchases should be dosed for lungworm during the quarantine period.

These procedures will reduce disease introduction and transmission in open herds.

As disease transmission can also occur by indirect contact with disease vectors e.g. farm visitors, vehicles etc., the following procedures should be implemented on all farms, regardless of cattle movement, in order to minimise the disease risk.

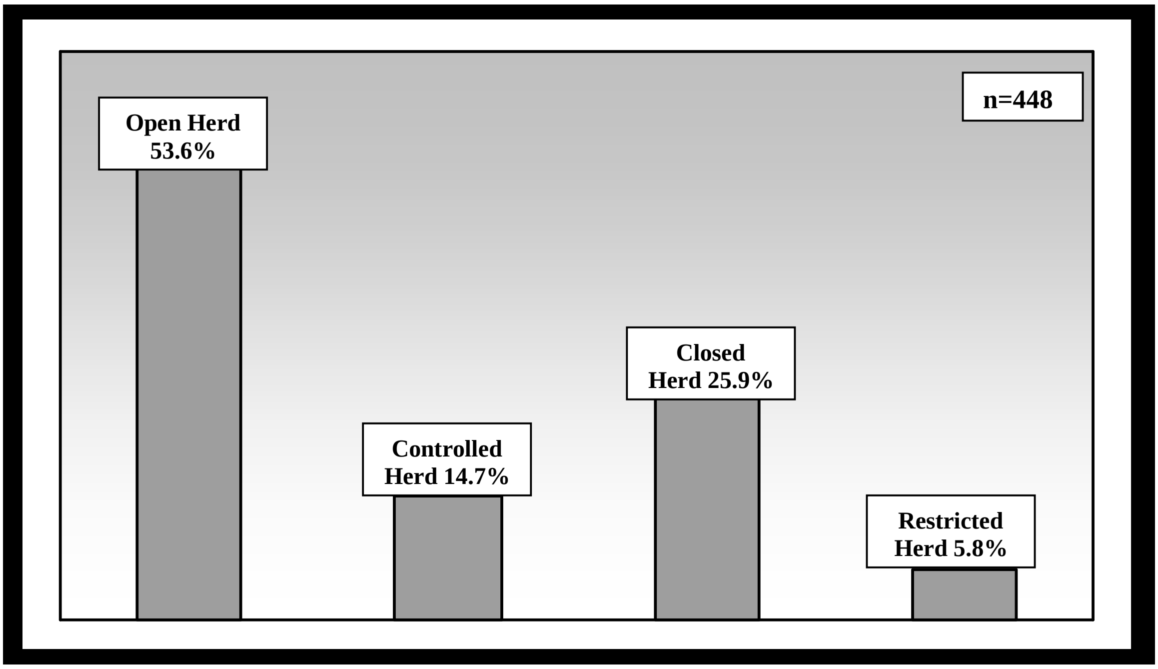
- Footbaths – the use of well-maintained (cleaned and re-filled regularly) will reduce the disease risk on farms.
- Signage should be used to maintain awareness of biosecurity on farm
- Basic veterinary equipment e.g. nose tongs, should be available on every farm. Transfer of nose tongs from one farm to another without sufficient disinfection between farms can result in disease introduction.
- Separate disposable needles should be used for each animal when administering medications or taking samples.
- Separate rectal sleeves should be used for each animal when scanning, examining or treating cows.
- Importation of slurry should be avoided.
- Importation of colostrum should be avoided.
- Vehicles visiting the farm should be kept at a safe distance from animal areas e.g. housing, holding yards, roadways. This is particularly important in the case of knackery carcass collection vehicles, which should not be permitted to enter farms and should collect carcasses from the farm entrance only.

It is important to recognise that an animal health plan once implemented will act as an insurance policy against infectious diseases. It is not a guarantee that a herd will remain disease free but it will significantly reduce the risk of disease introduction into a herd.

National Biosecurity Survey

Teagasc Moorepark recently carried out a survey of Irish dairy farmers, veterinary surgeons and Teagasc dairy advisors with regards to biosecurity. Dairy farmers were surveyed with regards to their awareness of biosecurity and their opinions of the impact implementation of a biosecurity plan would have on their farm. The only previous study to have examined aspects of biosecurity on Irish dairy farms was carried out in 1996 (Leonard et al., 2001). A 2-tier stratification strategy was employed to target farmers for the survey, firstly on the basis of geographical region, and secondly, on the basis of milk quota. A total of 704 questionnaires were posted to farmers with 450 responses received yielding a response rate of 63%. Results indicate that over 70% of Irish dairy farmers consider biosecurity important in minimizing disease introduction and spread. Over 53%, however, stated that a lack of information prevents them from implementing biosecurity. The importance of a closed herd strategy in the prevention of infectious disease is clearly under-promoted, with over half of dairy farmers operating open herd systems (Figure 1). Bearing in mind that movement of a single diseased animal onto a farm can potentially result in a costly disease outbreak, every effort must be made to change the cattle movement profile of dairy herds and increase the numbers of closed herds operating.

Figure 1: Cattle movement profile of Irish dairy herds



Open herd	free movement of cattle onto the farm
Controlled herd	a written health history is required for all newly purchased cattle moving onto the farm
Closed herd	no movement of cattle onto the farm
Restricted herd	only re-entry of existing farm cattle onto the farm allowed e.g. return from mart, show

The survey also highlighted that the importance of diagnostic testing in disease prevention is not well recognized, as almost 90% of dairy farmers surveyed indicated that they do not pre-test purchased animals for any diseases other than bovine tuberculosis and brucellosis. A lack of knowledge and advice would appear to be the main underlying reasons for the underutilization of diagnostic testing (Table 2).

Table 2: Do you test bought-in cattle for any diseases besides TB and brucellosis?

Survey Response	%	Why not? (n = 242)	%
YES	**7.5%**	**IT IS OF NO BENEFIT**	**21.1%**
NO	**89.4%**	**I DON'T KNOW WHAT DISEASES TO TEST FOR**	**20.3%**
SOMETIMES	**3.1%**	**I WAS NEVER ADVISED TO**	**44.6%**
	100%	**IT IS TOO EXPENSIVE**	14.0%
			100%

Similarly, of those farmers surveyed that purchase cattle (n=262), only 2.7% of farmers request veterinary health certificates for purchased cattle (Table 3).

Table 3: Which of the following do you do to avoid buying animals with disease?

Survey Responses (Multiple responses possible)	Response Count	%
Total respondents that purchase cattle	**262**	
I TALK TO THE SELLER	**179**	**68.3%**
I LOOK AT THE CATTLE	**147**	**56.1%**
I REQUEST TEST RESULTS FOR THE CATTLE	**97**	**37.0%**
I TALK TO THE SELLER'S VET	**3**	**1.2%**
I REQUEST A VETERINARY HEALTH CERTIFICATE FOR THE CATTLE	**7**	**2.7%**
NONE OF THE ABOVE	**29**	**11.1%**

As with diagnostic testing, Table 4 indicates that lack of information would appear to be the primary reason preventing farmers from implementing biosecurity measures with 53.4% stating that they don't have enough information to implement it. Proper quarantine is also extremely under-utilized with only 20% of farmers stating that they always implement proper quarantine procedures.

Table 4: What might prevent you from implementing biosecurity on your farm?

Survey Response	%
I DON'T HAVE ENOUGH INFORMATION ON WHAT TO DO	**53.4%**
IT WOULD COST TOO MUCH MONEY	19.3%
I DON'T HAVE THE TIME	**15.6%**
I DON'T FEEL IT WOULD REDUCE DISEASE ON MY FARM	**11.7%**
	100%

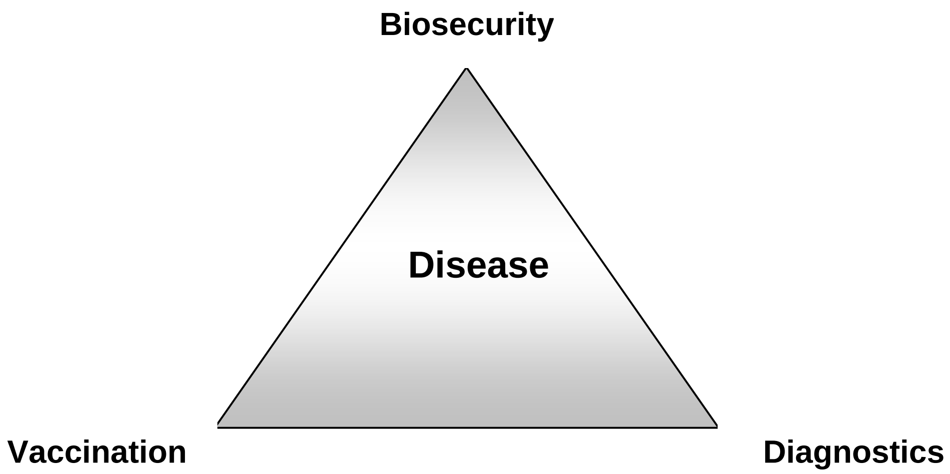
In term of vaccine use in Ireland, it would appear that the up-take of vaccines is much greater than the up-take of either biosecurity or diagnostic testing with BVD, Clostridial disease (e.g. Blackleg), Leptospirosis and Salmonellosis vaccines being most commonly used (Table 5).

Table 5: Vaccine use amongst surveyed farmers

Vaccine use amongst surveyed farmers (n=440)			
Disease Vaccinated For	**%**	**Disease Vaccinated For**	**%**
BVD	**41.1%**	**PNEUMONIA**	**7.5%**
CALF SCOUR	15.2%	RINGWORM	2.3%
CLOSTRIDIAL DISEASES	**43.9%**	**SALMONELLOSIS**	**27.3%**
IBR	6.6%	NO VACCINES USED	13.0%
LEPTOSPIROSIS	60.7%		

Vaccines play a hugely important role in the control of many infectious diseases. Their use, however, without the supporting knowledge provided by diagnostic testing and the implementation of a biosecurity plan, could potentially undermine their effectiveness in a disease control programme. They should be viewed as a component of a control programme but not the sole means of disease prevention within a herd (Figure 2). Over-reliance on vaccination without the backup of proper management, biosecurity and diagnostics should be avoided, with vaccine breakdown a potential consequence.

Figure 2: Components of an on-farm health planning and disease control programme



With 93% and 77.7% of surveyed farmers stating that they ‘rarely’ or ‘never’ requested biosecurity information from their Teagasc advisor or vet, respectively, it is clear that it is necessary to orientate farmers and their supporting network toward preventative rather than curative animal health strategies. However the survey did indicate that dairy farmers are willing to adopt an integrated herd health programme, with 60% of surveyed indicating that they would voluntarily join a cattle health scheme combining biosecurity, vaccination and diagnostic testing, and more importantly, would pay a premium price for cattle from such as scheme. Similarly 86.2% of dairy farmers indicated that they would implement biosecurity guidelines if supplied despite the fact that 35% might be prevented from implementing biosecurity through lack of time or the costs involved (Table 4). This highlights the absolute necessity to present biosecurity to dairy farmers as a practical and economically feasible package.

Planned Research Programme at Moorepark

Disease control, biosecurity, and on-farm health planning such as herd health statements will prove crucial to achieving optimal efficiency on dairy farms in order to meet the increasing demands of dairy markets. Due to the impact of non-regulated infectious disease on Irish dairy farms and the necessity to actively promote on-farm health planning, Teagasc, Moorepark has initiated a new herd health research initiative – the 'Herd Ahead' programme. Numerous studies on infectious disease prevalence, biosecurity protocols, disease impact and on-farm health planning have been carried out internationally (Bartels et al., 2006; Heuer et al., 2007; Maunsell & Donovan, 2008; Olsson et al., 2001; Ortiz-Pelaez, A. 2006; Payne et al., 1999; Van Schaik et al., 1998a; Van Schaik et al., 1998b; Van Schaik, 2001). Such studies are lacking in Ireland, the most recent study to look at aspects of biosecurity and disease incidence carried out in 1996 by Leonard et al, (2001). This project aims to address the lack of recent published disease prevalence data for BVD, IBR, leptospirosis and a range of addition infectious diseases, and to then use that data as a basis for designing a dairy herd health strategy. This project will identify the non-regulatory infectious diseases requiring prioritisation in Ireland based on prevalence and economic impact data. Economic impact studies are required in order to achieve stakeholder 'buy-in' to the concept of on-farm health planning and these will be carried out by examining disease seroprevalence and subsequently calculating inferred costs of disease across study farms (Heuer et al, 2007). In terms of on-farm health planning, the project should result in an increased awareness and implementation of biosecurity, continuous disease monitoring, appropriate vaccination, and farm-specific health statements on Irish dairy farms. The baseline data generated in this study will act as a benchmark from which the impact of future herd health strategies and their contribution towards sustainable dairy farming can be measured.

The overall project objective, therefore, is to generate the necessary biosecurity, disease prevalence, cost benefit and epidemiological data to support the development and eventual implementation of a voluntary health statement system within the Irish dairy sector. Similar systems are operating successfully in other countries and, although these countries do operate centralised milk testing laboratories, Ireland does have the advantage of an existing data reporting system which could be adapted to allow efficient reporting of results and interpretation of data i.e. the ICBF database and HerdPlus reporting system. Diagnostics will play an important role in disease monitoring on dairy farms going forward and economical methods of sample collection and testing will be required. In this regard, the use of bulk milk testing in a centralized laboratory would provide the necessary vehicle to carry out economic and practical disease testing, as well as addressing the logistical concerns of running such a disease monitoring programme. Should such a milk-testing system be introduced, a practical, economical and functional health screening system for Irish dairy herds could be implemented in order to maintain competitiveness in an increasingly challenging global market.

Conclusion

Ireland is lagging behind its global trading partners in the implementation of on-farm health planning including biosecurity (More, 2008). Much of this is due to the lack of awareness of health planning amongst Irish farmers and also to the lack of accurate prevalence data with regard to non-regulatory infectious diseases. The 'Herd Ahead' programme will provide the necessary information required to assign individual farms a health status through voluntary disease monitoring and implementation of preventative biosecurity measures. The benefits to trade both nationally and internationally are obvious, with farmers and commercial enterprises being able to purchase animals of known and proven health status.

References

Bartels, C., van der Borne, B., Hoek, A., Middelesch, H., Swart, W. & van Schaik, G. (2006). Cattle health surveillance in the Netherlands; on how to combine anecdotal and census data. Proceedings of ISVEE.

Gunn, G.J., Heffernan, C., Hall, M., McLeod, A., & Hovi, M. (2008). Measuring and comparing constraints to improved biosecurity amongst GB farmers, veterinarians and the auxiliary industries. Preventive Veterinary Medicine.

Heuer, C., Healy, A., & Zerbini, C. (2007). Economic effects of exposure to bovine viral diarrhoea virus on dairy herds in New Zealand. Journal of Dairy Science. 90 : 5428-5438.

Hoe, F.G.H. & Ruegg, P.L. (2006). Opinions and practices of Wisconsin dairy producers about biosecurity and animal well-being. Journal of Dairy Science. 89 : 2297-2308.

Leonard, N., Egan, J., Griffin, J., Hanlon, A. & Poole, D. (2001). A survey of some factors relevant to animal welfare on 249 dairy farms in the Republic of Ireland. Part 2: data on incidence of disease, culling and biosecurity measures. Irish Veterinary Journal, 54: 454-456.

Maunsell, F. & Donovan, G.A. (2008). Biosecurity and Risk management for Dairy replacements. Veterinary Clinics of North America; Food Animal Practice. 24: 155-190.

Mee, J.F., Fahey, J. & Crilly, J. (1999). Breeding the Dairy Cow of the Future - Today's Challenges. Proceedings of the National Dairy Conference. http://www.teagasc.ie/publications/ndc1999/index.asp

More, S. (2007). Shaping our future: animal health in a global trading environment. Irish Veterinary Journal. 60: 540-545.

More, S. (2008). A case for increased private sector involvement in Ireland’s national animal health services. Irish Veterinary Journal. 61: 92-100.

O’Donnell, S., Shalloo, L., Butler, A.M. & Horan, B. (2008). A survey analysis of opportunities, challenges and limitations of Irish Dairy Farmers. In press.

Olsson, S-O., Baekbo, P., Hansson, SÖ, Rautala, H. & Østerås. (2001). Disease recording systems and herd health schemes from production diseases. Acta Veterinaria Scandinavica, 42 (Suppl 1).

Ortiz-Pelaez, A. 2006. Risk classification criteria of disease presence in cattle herds using externally measurable factors. Proceeding of ISVEE.

Payne, M., Bruhn, M., Reed, B., Scearce, A. & O'Donnell. (1999). On-farm quality assurance programs: a survey of producer and industry leader opinions. Journal of Dairy Science, 82 : 2224-2230.

Van Schaik, G., Dijkhuizen, A.A., Huirne, R.B.M., Schukken, Y.H., Nielen, M. & Hage, H.J. (1998a). Risk factors for existence of Bovine Herpes Virus 1 antibodies on nonvaccinating Dutch dairy farms. Preventive Veterinary Medicine, 34: 125-136.

Van Schaik, G., Dijkhuizen, A.A., Huirne, R.B.M., & Benedictus, G. (1998b). Adaptive conjoint analysis to determine perceived risk of farmers, veterinarians and AI technicians for introduction of BHV1 to dairy farms. Preventive Veterinary Medicine, 37: 101-112.

Van Schaik, G. (2001). Risk and economics of disease introduction to dairy farms. Tijdschr Diergeneeskd. 15 : 414-418.

Villarroel, A, Dargatz, D.A, Lane, V.A., McCluskey, B.J. & Salman, M.D. (2007). Food for thought for food animal veterinarians: Suggested outline of potential critical control points for biosecurity and biocontainment on large dairy farms. JAVMA, 230: 808-819.

Genomic Selection to Increase EBI

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Summary

- Genomic selection is a new source of data for genetic evaluation of animals which involves translating the DNA signature of an animal into its EBI and genetic merit for all other evaluated traits including milk production, fertility, health, beef and type

- The greater the amount of data on an animal or its relatives, the greater the reliability of the animal's EBI. Therefore genomic selection is expected to increase the reliability of EBI, the extent to which it increases the reliability will depend on the on-going research but the improvement will no doubt improve over the coming years also

- The DNA of an individual is present in every cell and remains the same throughout the animal's life. Therefore, we can get DNA from an animal at one day of age and allowing for laboratory work and statistical analysis it should be possible to have a more accurate EBI of an animal at a young age

- Genomic selection will alter breeding programs. It will be relatively cheap to screen a large number of young bulls in Ireland as well as foreign bulls thereby increasing the genetic pool and thus genetic gain. Genetic gain using genomic selection can increase by 50% over current methods.

Introduction

Traditionally most breeding programs in Holstein-Friesian populations selected aggressively for milk production, with some breeding programs also favouring angularity. It is now well accepted internationally that such a strategy has led to deterioration in genetic merit for health and fertility in dairy cattle. Although some of the negative genetic consequences can be amortised through management such as hormonal intervention or allowing slippage in calving patterns, these approaches are not sustainable long term.

To address this decline in genetic merit for health and fertility, while continuing to increase genetic merit for milk solids, Ireland has been placing an ever increasing emphasis on health and fertility within the breeding goal. The Scandinavian countries have applied selection pressure on health and fertility for many decades and the benefits can easily be seen in the superior health and fertility of the Scandinavian breeds. Other countries are now placing more and more emphasis on fertility in their breeding goal and the gap between the emphasis on fertility in Ireland and most other countries is narrowing as other realise that fertility is a serious issue and can be reversed through genetics.

Current approaches to genetic evaluation

Fundamental for genetic gain in profitability is a pertinent breeding goal such as the Economic Breeding Index (EBI) as well as the tools for accurately differentiating between animals for genetic merit of a given trait or index, and a structure to disseminate the genes of genetically superior animals into the commercial population. Essential for accurately estimating the genetic merit of a group of animals is high quality data, often referred to as phenotypes. Great strides have been made by Irish farmers and other organisations, under the guide of the ICBF, to input and collate high quality data on Irish dairy cattle. These data are invaluable in the estimation of accurate genetic proofs for bulls and cows. G€N€ IR€LAND® is the vehicle used to disseminate the genes of genetically superior animals into the commercial population.

National genetic evaluations in Ireland and all other countries are currently based on the theory of “contemporary comparison” which compares groups of animals producing under similar conditions (e.g., same herd and year and season of calving, same age etc.). However, the estimated breeding value, or EBI, of a new born calf or heifer is derived mainly from the genetic merit of its parents. We know that only one quarter of the variation in the performance of paternal half-sibs is attributable to their sire with the same being true for the contribution of a dam to maternal half-sibs. Half the variation is due to which combination of genes they get from the sire and dam. Therefore, it’s no wonder that we can’t fully predict how good an animal will perform based on the genetic merit of its parents, even if both parents are accurately evaluated. Because of this, the reliability of the EBI of a young animal is low.

The reliability of a young test sire or heifer as well as most stock bulls is approximately 30% for EBI compared to a reliability of 95 to 99% for proven sires. With a reliability of 30% the actual EBI of an animal can vary by ±€98 from its published EBI; in a small proportion of cases it can vary more than that. This variation is reduced to ±€12 in a well proven bull. This is an important point to remember when considering purchasing stock bulls. However, low reliability can be overcome by using a "team of bulls" which as the name suggests, means using more than one bull across your herd. Using a team of bulls means that the reliability of the average EBI of the team is considerably higher than the individual reliability of each bull. The analogy would be purchasing shares in more than one commodity thereby minimising the risk of some shares (or bulls) possibly decreasing since others are likely to increase. The calculation of the reliability of a team of unrelated bulls is simple and is given by the formula:

$$\textbf{\textit{Team reliability}} = 1 - \left(\frac{1 - \textbf{\textit{average reliability of the individual bulls in the team}}}{\textbf{\textit{number of bulls in the team}}} \right)$$

So the EBI of a team of 5 young bulls, each with a reliability of 30% (i.e., 0.30 for the equation above), will have a reliability of 86% associated with it.

Nonetheless, it is obvious that a more accurate estimate, or higher reliability, of the EBI of a young bull calf would be very beneficial both in giving farmers more confidence in their choice of young bulls as well as facilitating breeding organisations to more accurately identify better bull calves for entry in to G€N€ IR€LAND® be they sourced in Ireland or abroad. DNA technologies may offer a solution.

Previous research in genomics for animal breeding

DNA is the building blocks of genes, which in turn determine the attributes of an animal such as if a cow will milk more or be more fertile. DNA is present in all cells and, within an animal, is identical in all cells. Furthermore, DNA does not change over the lifetime of an animal (same as in humans). For this reason a great deal of research resources has been expended in recent decades on attempting to use DNA to identify genes that affect animal performance.

The theory was that genes would be found and by identifying cohorts of animals with the different variants of the gene it would be possible to determine which was the “good” variant and which was the “bad” variant. The objective of subsequent breeding programs would be to increase the frequency of the good variant in the population. This technique was termed gene assisted selection. The difficulty in this approach was that it was proving very difficult to find the important genetic variants. These difficulties arose because genes are very large and the genome, which contains all the genes in the cells is thus very large. Because of this it was difficult to determine where on the genome the important genetic variant was.

For this reason, another approach called “marker assisted selection” was proposed whereby genetic variants, now commonly referred to as genetic markers, that could be easily measured in the DNA of an animal were associated with performance. These genetic markers associated with good performance were to be bred into the population in the hope that this approach also bred in the genetic mutation causing the effect. This approach although suffering from the fact that each genetic marker may only have a small effect on performance in their own right did not require as large resources to identify potential useful genetic markers. However, marker assisted selection had other faults. The link between the “good” marker variant and the “good” genetic mutation actually causing the effect did not always hold across breeds, populations within breeds and even across sire lines within breeds. This meant that resources would have to be expended on a continuous basis to ensure marker assisted selection was successful across the entire population. Very few countries have implemented marker assisted selection in their dairy cattle breeding programs and where applied, the benefits of this approach are thought to be very small.

Genomic selection – The Theory

Genomic selection is more or less a large scale version of the previously described marker assisted selection. Rather than selection based on a few markers where the effect of each marker has been previously calculated, genomic selection involves simultaneous estimation of the effects of many thousands of genetic markers. Animals are then screened for all markers and their individual marker effects summed to give an EBI. These genetic markers are called single nucleotide polymorphisms abbreviated to SNPs (pronounced “snips”). The idea of genomic selection began back in 2001 based on a scientific publication by Meuwissen et al. (2001) and genomic selection became possible when US companies like Illumina and Affymetrix developed platforms that could cheaply screen an animal for tens of thousands of genetic markers at the one time. Technologies are currently available to quantify what variants each animal has across 54,001 different SNPs; this platform is commonly referred to as a "SNPchip" (pronounced snip-chip) and the number of SNPs on these chips is likely to increase considerably in the coming years. Small scale laboratories can generate information on genetic markers on hundreds of animals a week; what genetic markers an animal has is commonly called the animal’s genotype. This is essentially a “DNA signature”.

Advantages of genomic selection are a) resources do not have to be expended on identification and validation of individual genes that affect traits of importance, b) the reliability of EBIs is considerably higher for dams of potential young test sires and also for the young sires themselves, and c) generation intervals (i.e., average age of the parents when their progeny are born) of all potential selection pathways may be reduced thereby increasing annual genetic gain. Schaeffer (2006) in his evaluation of genomic selection in Canadian Holstein dairy cattle showed that genetic gain for a moderately heritable trait could be twice that of their current progeny testing scheme with a 92% savings on costs; he continued by stating that “the potential advantages of a genome-wide selection scheme are too great to ignore”.

Fundamental to the success of a genomic selection program is high quality phenotypes (e.g., accurate EBIs) and genotypes (i.e., data from the SNPchip) on a large a number of high reliability animals. These resources will allow the disentangling of the individual effects of the thousands of genetic markers on the trait of interest, which in Ireland is mainly the EBI. Estimating the effects of the each of the thousands of genetic markers or SNPs is commonly referred to as "training the SNPchip". The majority of the costs in a genomic selection program is in the training of the SNPchip and the more accurate this procedure is undertaken the greater than reliability of the young test sires when applied in practice.

Genomic selection – Current status in Ireland

Research on genomic selection in Ireland started back in 2006 when semen samples of commonly used dairy and beef sires were stored by Teagasc through funding from the Department of Agriculture's Research Stimulus Fund, Teagasc, The National Cattle Breeding Center and the ICBF. Semen straws were collected from Irish and foreign AI organisations as well as Irish farmers. Genotyping of Holstein-Friesian sires began in January 2008. DNA for the animals used to train the SNPchip, commonly referred to as the training population or reference population, was extracted from semen at Teagasc, Athenry. Genotyping was carried out by a commercial company in Denmark, since this facility is currently not available in Ireland. To date over 1,000 Holstein-Friesian sires have been genotyped. A collaboration agreement is in place with New Zealand to attempt to utilise their sire genotypes in our analyses ensuring that more accurate EBIs will be made available to Irish farmers.

Teagasc Moorepark and the ICBF are currently in strong collaboration with other countries and international breeding organisations/genetic evaluation centers to refine the statistical methodology to simultaneously estimate the effect of each of the SNPs on performance in Ireland; this methodology is well advanced although will need fine-tuning over the coming years as experience gathers in analysing such data. The end product of this research is simply a list of the thousands of SNPs and their effect on the different traits measured in Ireland such as EBI, its subindexes and component traits such as protein yield and calving interval as well as the traits not directly included in the EBI such as protein percentage, the individual type traits, and overall type. This table of effects is often referred to as a "key" and in this case it will be the "Irish key". It is referred to as a key because it is unique to Ireland and is of limited use in another country. Similarly a key developed in another country will be of limited use in Ireland. This is why it is crucially importantly that this research is undertaken in Ireland using Irish data. However, because the DNA of an animal never changes, a genotype generated in Ireland, Australia, New Zealand, Holland or any other country will be the same. Therefore, these genotypes may be passed across country borders, the SNP key applied and the most suitable bulls for Ireland identified. The same is true of screening Irish bull calves for their suitability in other countries.

It is anticipated that genomically calculated EBIs, generated by the ICBF, will be available to Irish dairy farmers in Spring 2009. If successful, Ireland could be one of the first countries in the world to produce publicly available genomic values of animals from a national genetic evaluation center and have the facility also available to generate genomic values on cows. Research contracted by the ICBF on the potential of genomic selection has shown that genetic gain in Ireland can be increased by 50% compared to current progeny testing schemes. How the AI organisations decide to exploit genomic selection is under consideration by the individual AI organisations. The cost of the research program to-date in Ireland (including labour) is estimated to be €450,000.

Soon after Spring 2009, research will focus on the possibility of calculating genomic EBIs for calves and cows. If successful, farmers will be able to obtain genomic EBIs (i.e., EBIs derived from the current method of genetic evaluation "blended" with genetic evaluation based on DNA) on their own animals. ICBF and Teagasc, Moorepark are currently evaluating the potential to extract DNA from an "ear punch" of an animal. This will remove the necessity of taking a blood sample since the early indications suggest that DNA extracted from hair samples is not consistently of good quality although research on this is still on-going. If adequate quality and quantity of DNA can be extracted from an ear punch then a farmer can tag a new-born calf at 1 day of age, send the sample to a laboratory where DNA extraction and genotyping will be undertaken. The DNA signature of the animal will be sent from the laboratory to the ICBF who in turn will undertake a genetic evaluation and post, e-mail or put up on the farmer's HERDPLUS internet site the genomic EBI of the calf which will be more accurate that the currently used parent average. Of fundamental importance is that the genotype of the animal remains in the ICBF database so it can be used to improve the estimates of the effects of each SNP thereby improving the reliability of the genetic evaluations.

Future research in genomic selection

Internationally, genomic selection is very much in its infancy and although considerable research is underway across the world a lot more questions need answering. However, arguably two of the most important areas of research for Ireland in the short term is the evaluation of alternative breeding programs to maximise the full exploitation of genomics for Irish farmers and the development of a “low cost chip” for screening animals. The best genetics for Ireland are in Ireland but a national breeding program must also introduce germplasm from other countries. Genomic selection, if used correctly, will aid greatly in identifying suitable germplasm in other countries.

The cost of genotyping an animal with the large SNPchip is approximately €250-300. This is prohibitively expensive for individual farmers to screen all potential replacement heifers or breeding females. Although not known for certain, we expect only a few hundred genes to affect individual traits such as milk yield. Therefore it seems plausible, in theory at least, to develop a SNPchip with hundreds rather than thousands of relevant SNPs thereby reducing the overall cost to screen animals. Although the cost will depend on the number of SNPs eventually included in the reduced chip as well as the number of animals screened, an estimate would be that the cost of results from the smaller would be approximately one third of that of the larger chip.

Conclusions

Key to maximising genetic gain in profitability are a well defined breeding objective, high quality data to distinguish between animals of good and poor genetic merit, and a structured breeding program to efficiently disseminate superior genes into the commercial population. All three factors are well advanced in Ireland. To-date estimated EBIs of sires/animals have been derived from parental information as well as phenotypic records of the daughter/cow for traits such as milk yield and calving dates. Genomic selection, which measures differences in the DNA signature of animals, offers another source of data. However, these data are available once a biological sample can be taken from the animal. EBI reliability of a young animal with genomic information (i.e., information on its DNA) will be greater than based solely on parent average. Genomic selection has the potential to increase genetic gain in EBI by 50%, or in other words from approximately €23/year to €35/year. This equates to over €2.5m annually for the Irish dairy industry which is cumulative and permanent.

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References

Meuwissen, T.H.E., B.J. Hayes, and M.E. Goddard. 2001. Prediction of total genetic value using genome-wide dense marker maps. Genetics. 157:1819-1829.

Schaeffer, L.R., 2006. Strategy for applying genome-wide selection in dairy cattle. J. Anim. Breed. Genet. 123:218-223.

Improving Reproductive Performance

Fertility management in dairy cows

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Summary

- Use heat detection aids that suit your system because efficient heat detection is an essential component of successful dairying.
- Maiden heifers should be bred to calve at the start of the breeding period.
- Body condition scoring is an important herd management tool to improve fertility performance.
- Cows should be managed to calve down at the appropriate body condition score and fed during early lactation to minimize loss.
- Good records of all problems/disorders around calving are essential in identifying cows with potential fertility problems during the breeding season.
- Choose sires that will improve genetics for milk production **AND** fertility traits in heifer replacements.
- If you need to pull back mean calving date, synchronisation of dairy cows to maximise submission rates early in the breeding season will be beneficial.

Introduction

The dairy industry in Ireland is facing new and challenging times, and achieving a compact calving pattern will be essential to maximise profitability. The focus of this report is to identify the key principles that farmers will need to incorporate into their management system to achieve good submission and conception rates.

Drivers of compact calving

The six-week in-calf rate is the percentage of cows that become pregnant in the first six weeks of the breeding season. Simply put, the six week in-calf rate is a product of the submission and conception rates achieved on the farm. It is not possible to achieve a high six week in-calf rate without having good submission rates, and this in turn is dependent on heat detection efficiency. It is difficult to quickly achieve a big improvement in conception rate, but with appropriate use of heat detection aids and observation, it is possible to shift heat detection rate from 50% to 90%. At a conception rate of 50% to each service, increasing the heat detection rate from 50% to 90% will reduce the number of non-pregnant cows at the end of a 12 week breeding season from 32% to 9%. Previous research had indicated that failure to detect oestrus is a bigger cause of reproductive wastage than poor cow fertility.

How do I improve heat detection efficiency?

The principal indication that a cow is in heat is observing her standing to be mounted by other cows. A cow is also likely to be in heat if tail paint has been removed, or if a heat mount detector has been activated. The intensity and duration of heat varies between herds, and more subtle indications of heat also have to be used. These include attempting to mount other cows, restlessness and bellowing, clear elastic strings of mucus being passed from the vagina, swelling and reddening of the vulva, standing with back arched and tail in the air, poor milk letdown, hair loss and dirt marks along the tail head and flanks, partial but not complete removal of tail paint, and loss of a glued-on heat mount detector. If blood is observed on the tail or around the vulva, this cow was recently in heat, and should be watched for a return to heat 17-20 days later. It is essential that all staff involved in heat detection are trained and familiar with the signs of heat, and recognise the importance of good heat detection in determining the reproductive performance of the herd.

A 'normal' oestrous cycle in dairy cows lasts 18-24 days, resulting in an average cycle length of 21 days. On average, cows commence cycling 30 to 35 days postpartum. The first heat is usually silent, and the first cycle after this heat is usually short (8-12 days). It is valuable to know the cycling status of the herd before mating start date. This can be achieved by starting heat detection 3 to 4 weeks before MSD. This has the benefit of identifying cows that have not yet returned to cyclicity at MSD, and also provides information on when cows are due to return to heat during the first 21 days of the breeding period.

Heat detection aids

The most commonly used heat detection aid in Ireland is tail paint. Tail painting – with paint applied one to three times per week depending on type of paint used, weather conditions, and stage of the breeding season – combined with 3 times per day visual observation results in high submission rates in the first three weeks of the breeding season. If frequent application of tail paint is not feasible, new devices are available that are designed to remain attached to the cow for >6 weeks, and should be replaced only after they are activated following mounting by herdmates.

A Moorepark study carried out in spring 2007 examined the performance of four heat detection aids. The aids on study were (i) FIL tail paint (paint in a bottle); (ii) Paint stick; (iii) Check Mate mount detectors; and (iv) Estrotect scratch cards. Both the CheckMate and Estrotect are made with the glue already applied. You simply peel off the back, warm the device, and stick onto a clean, dry tail head. The manufacturers of both these devices claim they will stay on the cow for up to 6 weeks or more, eliminating the need for frequent topping up of tail paint. The FIL tail paint used is an oil-based fluorescent paint, and comes in a bottle with an applicator. Paint Stick is a device containing hard paint on a stick, and is used like a crayon. A total of 750 cows over 8 herds were used in the study. The different aids were applied before the mating start date and reapplied as required for the 6 weeks of the study.

What were the results?

The fertility results at the end of the season showed no major difference between any of the aids. They were in general equally good, with the exception of lower conception rate to first service for the CheckMate device (Figure 1). Each farmer in the study completed a questionnaire at the end of the breeding season and were asked to score each aid on (a) ease of application; (b) ease of interpretation, (c) accuracy and (d) labour saving potential. (1 to 5 score: 1 = no beneficial effect; 5 = highly beneficial effect). The farmers reported a lower score for ease of application for both CheckMate and Estrotect compared to FIL tail paint or Paint Stick (Figure 2). This was mainly because they had to heat the devices before sticking on the aids. There was no major difference in accuracy of heat detection according to the results. The Checkmate and Estrotect devices did not improve labour efficiency, primarily because too many of them fell off and had to be reapplied at frequent intervals. This is always going to be a problem with stick-on devices, particularly in the spring when cows are moulting. Each of the aids had positives and negatives. The Paint Stick can be used when cows are wet, but the farmers on the study used twice as much as the supplier suggests. FIL tail paint lasted longer than normal paint, is relatively cheap compared to others on trial, and comes in four bright colours. The bottom line is that if you want to achieve a good submission rate, you must use heat detection aids. There is a variety of aids available; choose one that suits your system.

Automated Heat Detection

During oestrus, cows increase physical activity; for example cows in indoor feeding systems have a roughly 2 to 4 fold increase in walking time compared to cows not in oestrus. A number of companies are now marketing activity meters for the Irish market. To date, these devices have had only limited uptake in Ireland, primarily due to their cost, and also concerns about their ability to accurately identify cows in heat on pasture-based systems where cows are moving different distances every day. Improvements in technology and software in the last decade should help make these devices more accurate on pasture.

In April 2007, 173 cows in Moorepark's Ballydague farm were fitted with Dairymaster MooMonitor collars. The collar contains an accelerometer device that continuously monitors movement in all directions, and the information is automatically retrieved at each milking. The activity data for each cow is then compared against her activity over the preceding number of days, and cows with an abrupt rise in activity are flagged for examination. To validate the results of the activity collars, milk samples were collected for progesterone analysis from all cows for the first 6 weeks of the breeding season to allow accurate identification of when cows were in heat.

At the end of the study, heats identified by the MooMonitor activity meter were compared against heats confirmed by the milk progesterone data. During the monitoring period, the MooMonitor device correctly identified 82% of the heats that occurred, and had an error rate of 6.8% (i.e 7 out of 100 cows incorrectly identified as being in heat). These are encouraging results that indicate the system is capable of operating well in a pasture-based system. Further monitoring of activity devices is planned with spring and autumn cows.

Body condition scoring

Body condition scoring is an objective assessment of a cows body reserves at a given point in time, with values ranging from 1 (extremely thin) to 5 (obese). Moorepark research has shown that body condition score (BCS) at the time of first service and the loss in body condition from calving to first service affect the reproductive performance of dairy cattle. Maintaining the appropriate herd BCS profile should be viewed as a component of the long term farm management strategy, and sudden losses (e.g. after calving) or sudden gains (e.g., during the dry period) should be avoided when possible. Target scores for key times during the year have been identified and are summarised in Table 1.

Table 1: Target body condition scores at key times of the year.

	Target scores	
	Herd average	**Range**
Drying off	3.0	2.75 to 3.25
Pre-calving	3.25	3.0 to 3.5
Start of breeding	2.9	2.75 to 3.25

The key points are that you want your cows to gain very little during the dry period, and hence they must be close to the desired BCS at dry-off. Avoid over-conditioning of cows during the dry period. Cows with a BCS of 4 or more have a high incidence of postpartum disorders, including fatty liver, milk fever, retained placenta, metritis, and ketosis. Cows with excessive BCS at parturition will lose a lot of condition after calving. Excessive loss of bodyweight and body condition results in anoestrus, cystic ovaries, poor expression of oestrus, decreased conception rates and increased incidence of embryonic mortality. Feed cows in early lactation to minimize BCS loss.

It can be difficult to achieve the BCS targets outlined above with cows that have been aggressively selected for increased milk yield. Research at Curtin's farm has indicated that high-production type cows lose BC during early lactation, but fail to regain BC during the remainder of the lactation. Feeding higher levels of concentrate to these cows results in higher milk production, but doesn't improve BCS. In the short term, the BCS of these cows can be improved by 1) turning cows out to a high quality pasture soon after calving rather than feeding indoors on grass silage; 2) shortening the duration of the dry period from 8 weeks to 4 weeks reduces the inherent drive to produce milk in the subsequent lactation, and hence improves BCS;

3) adopting once-a-day milking for set periods of time when necessary. In the long term, these cows are unsuitable for seasonal-calving grass-based systems of production. The genetic make-up of this type of cow is more suited to high-input year-round-calving systems of production, the common practise in the countries that produce their genetics (USA, Canada, and Holland).

Genetics for milk production and fertility traits

Fertility traits have been included in the Economic Breeding Index since 2000. Prior to this, the Relative Breeding Index (RBI) was based primarily on milk production traits. Sires that ranked highly on the RBI system were demoted to a much lower rank on the EBI system because the daughters of many high RBI sires had poor phenotypic fertility performance. As a result, farmers were – indirectly and unintentionally – selecting for poor fertility for many years. It is important to examine the active bull list ahead of each breeding season, and select sires that will improve genetics for both milk production and fertility. A long-term project on the genetics of subfertility was established in Moorepark in 2008. In-calf heifers calving for the first time in spring 2008 with similar genetics for milk production traits, but extremes of high or low genetics for fertility traits, were identified from within the national herd. A subset of these were purchased, moved into the Moorepark herd, and managed as a single group for the 2008 spring breeding period and grazing season. Fertility performance was superior in the high fertility strain of cows; conception rates to first service were 35% vs. 55% and the 6-week in calf rates were 39% vs. 72% for the low and high fertility groups, respectively. Importantly, milk production was similar for both groups. The reproductive performance of the low fertility group in their first lactation indicates that these animals are unsuitable for seasonal compact-calving systems of production. These results clearly underline the importance of selecting for good fertility. These animals will be used in the future to explore the physiological and genetic basis of subfertility in dairy cattle.

Cow Synchronisation

In recent years, the mean calving date of the national herd has slipped from mid-February to mid-March, which negatively affects the potential profitability of grass-based systems. Reversing this continuing trend for slipping mean calving date will be difficult. A large trial was carried out on 8 commercial dairy farms in spring 2008 to assess the potential of cow synchronisation to reduce the interval from mating-start-date to conception, thus reducing the calving interval and 'pulling back' mean calving date. The first treatment was a control group that received no interventions, and cows were inseminated following observed oestrus. The second treatment was a synchronisation protocol that synchronised oestrus (heat), but cows were required to be observed in heat for insemination. The third and fourth treatments synchronized ovulation and allowed fixed-time AI, i.e., cows did not need to be seen in heat, and were inseminated at a designated time regardless of whether they showed signs of heat or not. The results indicated superior submission rates for the two fixed time treatments (3 and 4), with conception rates generally similar to the controls and treatment 2 (see Table 2). The synchrony treatments resulted in shorter calving to service intervals and shorter calving to conception intervals. An obvious advantage of the fixed time protocols is that they facilitate increased use of AI, increasing the proportion of replacement heifers sired by high EBI sires. Further analysis of this dataset is planned to determine the cost-benefit of the different synchrony protocols.

Table 2: Synchronisation study reproduction results.

	1 (Control)	**Synch_2 (Observed heat)**	**Synch_3 (Fixed time AI)**	**Synch_4 (Fixed time AI)**
3 week submission rate	78.6	74.6	91.2	91.0
Conception rate 1st service (%)	53.5	57.2	53.7	48.0
Conception rate 2nd service (%)	54.0	50.9	54.1	55.4
Calving to service (days)	74.3	68.9	63.7	63.7
Calving to conception (days)	92.2	86.3	82.7	84.4

Problem cows

The majority of problem cows are those that had a health problem during calving and/or early lactation, and good records will identify many of them. Records should be maintained of cows having twins, calving difficulty, retained foetal membranes, and peripartum disorders (metritis, displaced abomasum, mastitis, etc.). Cows that encounter any of these problems are at risk of poor reproductive performance. Anoestrus is the term used to describe cows that have not resumed cyclicity after calving. Most cows start cycling by 35 days post calving, and show heat by 45 days post calving. High producing cows that are thin and have lost a lot of body condition (0.75 to 1 BCS units) are most at risk of anoestrus. Efficient pre-breeding heat detection will identify cows that are not cycling.

Follicular cysts are observed in up to 20% of cows in early lactation, but most resolve spontaneously within 40 days postpartum. At the start of breeding, the incidence of follicular cysts is generally very low (<5%). “Phantom cows” are non-pregnant cows that have been inseminated, but do not return to oestrus. Typically, these cows are not identified until examination after the end of the breeding season, and represent a major challenge to efficient reproductive performance. Phantom cows arise due to late embryonic mortality (weeks 4 and 5 post-insemination). The incidence is increased when body condition score is low, and when cows are inseminated <50 days postpartum.

Many cows will calve down at an appropriate body condition, have a trouble free calving, and lactation will begin well. Some will even show signs of early postpartum cyclicity. If a cow then succumbs to a health problem, her appetite and feed intake will decrease, and if the condition persists, substantial body condition may be lost. This cow, having calved and begun lactation in the best manner possible, is now at risk of poor reproductive performance. The health problems that lead to this situation include mastitis, displaced abomasum, ketosis, digestive disorders, lameness problems, injuries, and infections. The incidence of these health problems can be reduced, and herd health preventive programmes should be initiated to minimize their incidence. For example, discuss the need to use certain vaccines in your herd, given your circumstances, with your vet. To avoid any potential detrimental effect of the vaccination process, it is best to finish injecting before the breeding season commences.

The Benefits of On-Off Grazing

On/Off Grazing: another way to extend the grazing season!

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Summary

- Two × three hour grazing periods (after milking) is the optimum on/off grazing time period to allocate spring calved cows in early lactation
- Grass silage supplementation can be eliminated from the diet with the use of on/off grazing
- On/off grazing dairy cows has no affect on milk production performance
- Cows given access to pasture in two distinct grazing periods can achieve 95% of the intake achieved by cows given access for 22hours
- Sward re-growth is 30% higher on paddocks on/off grazed compared to poached swards
- On/off grazing is a grazing management tool that can be implemented on all soil types

Introduction

Greater profitability can be achieved by improving grassland management practices. The most fundamental way of achieving lower cost production is to target a longer grazing season with higher grass utilisation. Nationally, grass utilisation on Irish dairy farms is low (60-65%). Grazing stocking rates on Irish dairy farms are also low (1.8 LU/ha), however concentrate feed input is high relative to the grazing stocking rates. It is clear that higher grass utilisation can be achieved through different approaches in grassland management. Traditionally, in early spring freshly calved dairy cows remain indoors and are offered grass silage and concentrate as the main component of their diet. Increasing the proportion of grass in the cow's diet in spring leads to four positive effects (i) higher milk solids (ii) higher total dry matter intake (iii) increased sward quality for subsequent rotations and finally (iv) higher profitability - each extra day at grass in spring is worth €2.70 per cow/day.

In spring ground condition and prevailing weather can reduce opportunities for grazing. During the summer months of the past two grazing season's dairy farmers have experienced challenging grazing conditions. Correct infrastructure such as farm roadways, multiple access points to paddocks and a good water trough layout all assist the pursuit of extending the grazing season into early spring. Management strategies, coupled with the above, can further increase grazing days. The technique of '**on/off grazing**' management has a role to play on all Irish dairy farms. This is an approach whereby cows graze for a limited period (3 – 5 hours in two periods) before returning indoors. On/off grazing strikes the balance between feeding cows adequately at grass while minimising the level of pasture damage. This strategy can be implemented during periods of wet weather/poor ground conditions to increase the number of days at grass.

Moorepark Dairy Production Research Centre has set a target of a 300-day grazing season (February 1st to December 1st) on a dry soil type with 1000mm rain. At Kilmaley farm in West Clare, which is a wetter soil type (1600mm rainfall), a 220-day grazing season is targeted (March 15th to October 20th). These targets have been set by incorporating on/off grazing into the management of the farms.

Grass silage for spring calving dairy cows

All evidence to date shows that grass silage is an average feed to offer dairy cows in early lactation. Dillon et al. (1995) and Kennedy et al (2005) have shown the improvement in both total dry matter intake (+0.5kg DM) and milk solids (+ 0.1kg) from including grazed grass in the diet of the dairy herd early in lactation. Grass silage quality on Irish farms is not improving and has remained static for most of the last decade. The capacity to improve grass utilisation on Irish dairy farms is substantial; this was clearly shown at last years Teagasc National Dairy conference in the paper presented by Ramsbottom et al. (2007).

In spring the level of grass offered to cows should be sufficient not to require grass silage supplementation. Grass allowances of 13-15kg grass DM with 3kg concentrate are adequate to feed cows sufficiently in early lactation. These allowances are achievable at farm level, given that national farm stocking rates are on average only 1.8 LU/ha nationally and calving patterns are extended (currently 54% of the national herd calves in 6 weeks). Thus, demand for spring grass is low – with a planned closing strategy in autumn, spring grass supply should not be a problem. The bigger problem is ground conditions in spring. However on/off grazing is a strategy which will alleviate this problem.

How does on/off grazing work?

In a normal day a dairy cow grazes for approximately 9 – 10 hours, ruminates for between 7 and 9 hours; and spends the remainder of her time walking, idling or being milked. Cows have two main grazing bouts during the day. The first main grazing bout occurs early in the morning (where some cows can graze for up to three hours continuously), typically after morning milking. The second longest grazing bout occurs later in the evening after p.m. milking. Previous experiments have shown that dairy cows have a natural compulsion to graze after a period of fasting – this explains why cows have a long grazing bout after both milkings. Figure 1 depicts the grazing activities of a typical Irish dairy cow offered full time access to grass.

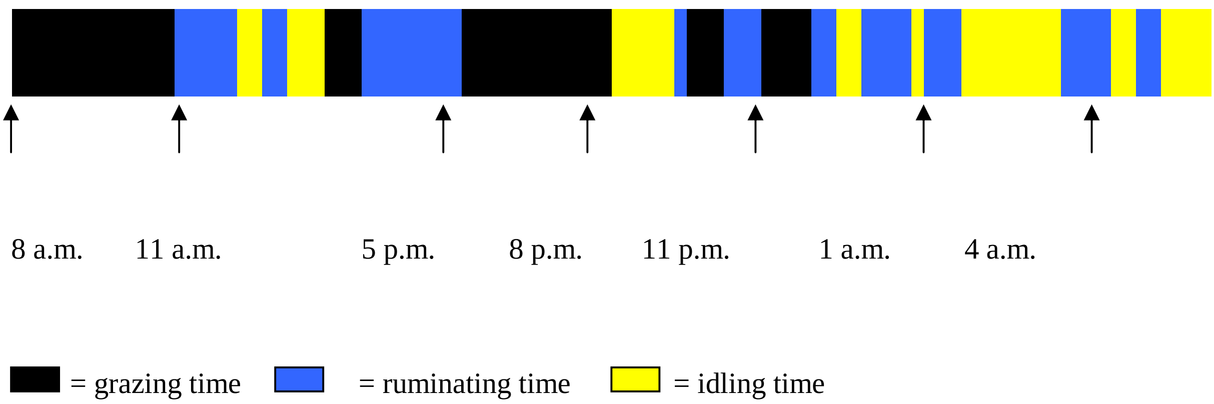


Figure 1. Grazing pattern of a typical Irish spring calving dairy cow offered full-time access to pasture

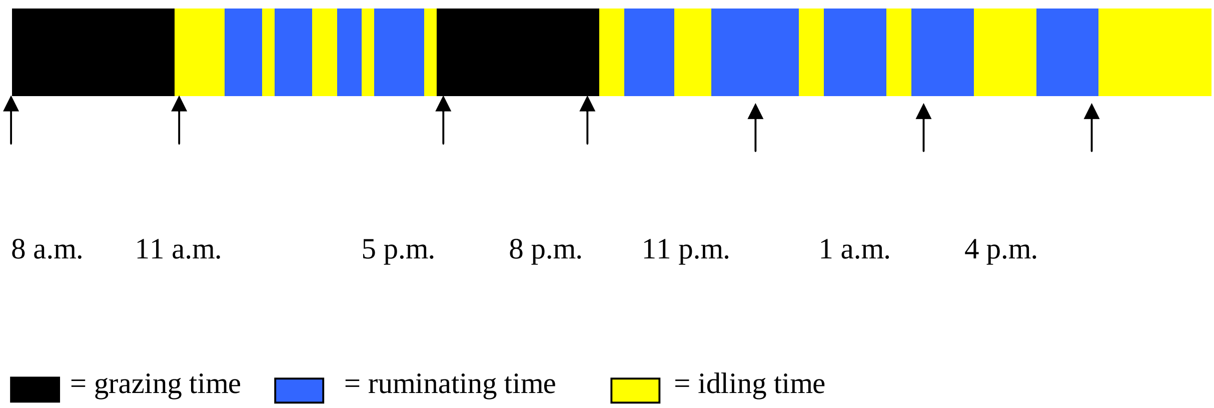
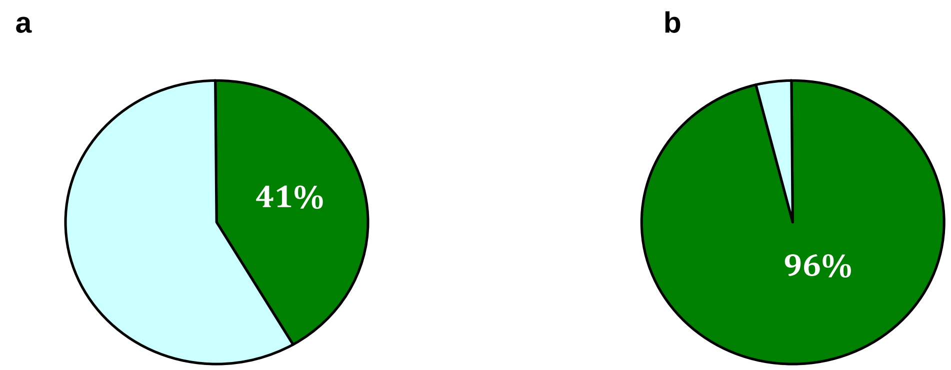


Figure 2. Grazing pattern of a spring calving dairy cow offered two three hour periods at grass after each milking

The aim behind the concept of on/off grazing is to take advantage of the cows own natural instinctive ability to graze and to ensure she achieves a high intake level when given access to grass. The cow in Figure 2 was offered 3 hours access to pasture after each milking (6 hours total for the day). From this figure it is clear that this cow only had 2 grazing bouts during the 24 hour period. It is also evident that each of these bouts was almost 3 hours long – this cow grazed for 5.8 hours of the 6 that she was at grass, demonstrating that cows can change their grazing behaviour and adapt to the grazing regime imposed upon them. Cows generally adapt to the on/off grazing system quickly; in the studies carried out at Moorepark cows acclimatised after two days.



= proportion of time spent grazing while at grass

= proportion of time **not** grazing while at grass

Figure 3. Proportion of time at grass spent grazing

Figure 3a shows that cows given full time access to grass only graze for 41% of their time. The remainder of the time is spent ruminating, standing, walking etc. During periods of poor ground conditions such activities increase the risk of poaching. Cows given restricted access to grass (two × three hour periods) graze for 96% of their time at pasture (Figure 3b). Restricting access time increases the mean duration of grazing bouts while the total number of grazing bouts are reduced, such changes in cow behaviour can be interpreted as a response to the feeding situation. In summary, restricting pasture access time results in much greater grazing efficiency as these animals spend a greater proportion of their time at pasture grazing.

Effects of on/off grazing on milk production and grass dry matter intake

If a cow is offered restricted access to pasture in two periods (after both morning and evening milkings) can she achieve the same DM intake and production level as if on pasture for a full 24-hour period? A number of experiments investigating the effects of on/off grazing on dairy cow production have been undertaken at Teagasc Moorepark over the past two years. In February/March a four week study was carried out with early lactation spring calving cows. All cows were offered a daily grass allowance of 15.0kg DM/cow/day and 3kg DM/cow/day of concentrate. The treatments were as follows:

i) Full-time access to grass (**22 H**)

ii) 4.5 hours access to grass after morning milking and 4.5 hours after evening milking (**2×4.5H**)

iii) 3 hours access to grass after morning milking and 3 hours after evening milking (**2×3H**)

iv) 3 hours access to grass after morning milking and 3 hours after evening milking with an additional 3 kg DM of grass silage offered at night (**2×3H +Silage**)

The results of this experiment are presented in Table 1.

Table 1: Effect of on off grazing on milk production of spring calving dairy cows in early lactation

	22H	**2×4.5H**	**2×3H**	**2×3H +Silage**
Milk Yield (kg/d)	28.1	28.0	28.5	29.1
Milk fat content (%)	4.21	4.29	4.26	4.33
Milk protein content (%)	3.37	3.25	3.27	3.21
Milk lactose content (%)	4.69	4.67	4.78	4.73
Milk solids (kg/day)	2.1	2.1	2.2	2.2
Bodyweight (kg)	489	481	481	509
Body condition score	3.02	2.99	3.05	3.07
Post grazing height (cm)	3.9	4.1	4.3	4.8

In this study the behavioural adaptations of the cows to on/off grazing were sufficient to maintain milk production performance. Milk protein was highest when cows had full time access to grass (22H) and was severely reduced (-0.16%) when cows were supplemented with grass silage at night. Restricting access time had no effect on total milk solids yield. This study show that, with cows in early lactation (< 30 days calved), on/off grazing can be used successfully as a method of increasing grass in their diet.

A previous experiment examining the same concept with autumn calved cows in spring, also found no effect of restricting pasture access time on milk production between any of the treatments. Milk protein concentration was reduced when cows were offered grass for three hours after each milking compared to animals given full-time access to grass.

Other research groups have investigated on/off grazing with one access period to pasture. The results of their work have shown reduced milk production which was related to a decrease in grass intake (-18%). Other studies have shown no effect on herbage intake provided access time remains longer than 7 hours. Moorepark data (Figure 4) clearly shows that total pasture access time should be divided into two periods (after milking) rather than on continuous nine hour period between milkings (9H). By doing so, grass dry matter intake is not compromised, as the cow fulfils her natural grazing drive by having two large grazing bouts after each milking increasing total grass intake.

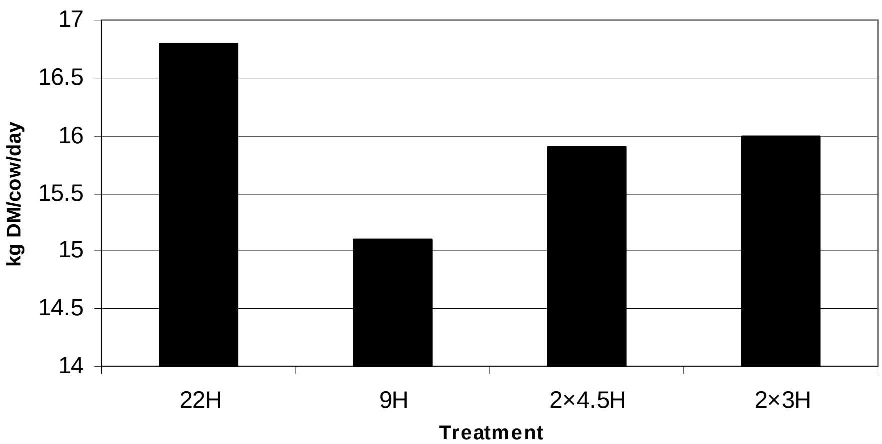


Figure 4. Total dry matter intake of cows given restricted access to pasture compared to full time turn-out.

Cows offered 2×3 or 2×4.5 hours access to pasture achieved 95% of the intake of cows given fulltime access to pasture. Given the high levels of intake that can be achieved and the fact that there is no reduction in milk production, it appears that 3 hours after each milking is sufficient for spring calving cows in early lactation. However, autumn calving cows in mid-lactation will require up to four and a half hours access to grass after each milking (due to the reduction in milk protein concentration with 2×3 hours).

In the context of this work it is important to note that both studies were over prolonged periods (4 weeks each) and there was no reduction in animal performance. At farm level such an extended time period may not be required. The Moorepark work indicates that on/off grazing may be a strategy that could be used in heavier soil types to extend the grazing season by turning cows out to pasture earlier in spring or grazing later in autumn. In the past two years at Kilmaley Research Farm, on/off grazing was successfully used during the months of July (2007) and August (2008). Such a technique was key to maintaining milk protein >3.5% during these periods of excessive rainfall and poor grazing conditions.

For on/off grazing to work successfully cows should **not** be offered grass silage when housed. It is clear from the results in Table 1 that although the cows from the 2×3S treatment were offered 3 kg DM of extra feed (grass silage) compared to all other groups milk solids was not increased. In fact, milk protein % decreased as did grass utilisation (+0.5cm in post grazing height). Spring management incorporating on/off grazing into the system can eliminate grass silage totally from the lactating cow's diet. Using on/off grazing as a grazing management tool is being successfully applied at farm level where the benefits reported in this paper are being experienced first hand.

Effects of on/off grazing on sward re-growth

The benefits of on/off grazing are not only confined to the animal, removing animals from pasture, thereby preventing poaching damage, appears to increase the re-growth capacity of a sward. Studies carried out at Moorepark in 2008 show that poaching damage incurred with full time access to pasture in wet conditions reduced re-growth by approximately 28% (400-500kg DM/ha) for the second grazing rotation. Early spring grazing improves the grass growth capacity of the farm. Therefore the use of on/off grazing can be a key component of spring grassland management.

Acknowledgements

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References

Dillon, P., Crosse. S., O'Brien B and Mayes, R.W. (2002). The effect of forage type and level of concentrate supplementation on the performance of spring-calving dairy cows in early lactation. Grass and Forage Sciecne, 57, 212-224.

Kennedy, E, O'Donovan, M. Murphy, J.P. Delaby and O'Mara, F. (2005). Effects of grass pasture and concentrate based feeding systems for spring calving dairy cows in early spring on performance during lactation. Grass and Forage Science 60, 310-318.

Ramsbottom, G and Clarke, P (2007). Challenges to the adoption of high profit dairy systems. In; Exploiting the freedom to Milk, Teagasc National Dairy Conference pp 45-57.

Factors Affecting Mid Season Milk Protein Content

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Summary

- Protein is the most valuable component of milk and therefore is important in determining the economic return from milk production. However the milk protein content is generally lower in the mid season than would be expected given the stage of lactation of the cows.

- A survey of 45 dairy farms was carried out to examine the on-farm factors affecting mid-season milk protein.

- Higher milk protein content in mid-season is associated with higher quality grass, an earlier median calving date and a higher genetic merit for milk protein content.

- Maintaining sward quality during mid-season and choosing sires of high EBI that will improve protein yield, protein content and fertility is essential.

Introduction

Producing milk of high commercial value efficiently is the key objective in a profitable dairy enterprise. Many factors are involved in achieving this objective, with the nutrition of the cow being of prime importance. Grazed grass is the principal source of feed for dairy cows in Ireland, and it is attractive because of its high feed quality and relatively low cost. However, variability in grass growth rate and quality at specific times of the year present challenges with respect to providing adequate nutrients for optimal milk production and composition. Milk protein content increases gradually from March to May but in the months June, July and August declines somewhat or remains static and is generally lower than would be expected given the lactation stage of the majority of the cows at that time. The average protein concentration of manufacturing milk in Ireland in the calendar years 2005, 2006 and 2007 was 3.30%, 3.30% and 3.32% respectively. This annual profile of milk protein concentration is outlined in Figure 1. It shows the characteristic lower than expected protein content for the mid-season.

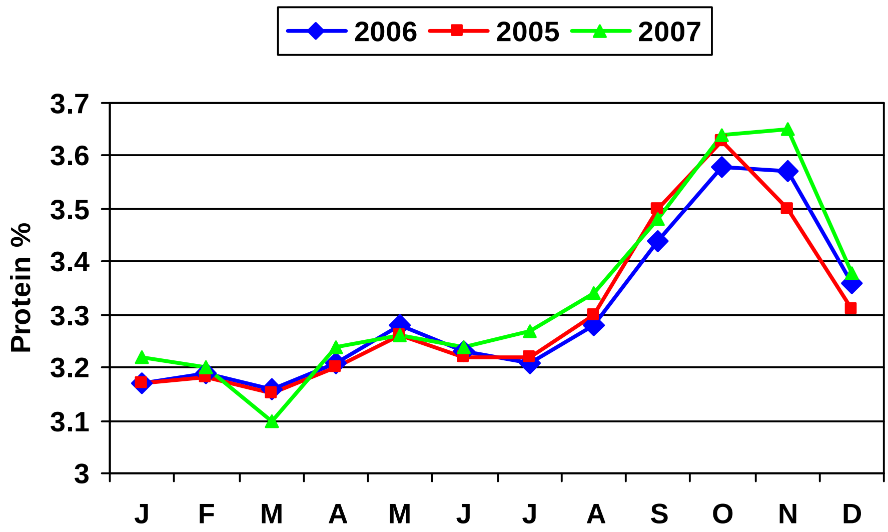

Figure 1. Milk protein percentage by month of year for manufacturing milk in 2005, 2006 & 2007.

The price paid for manufacturing milk in Ireland is primarily determined by its contents of fat and protein, with bonuses/penalties for quality parameters. Currently the value of milk protein is between 2 and 3 fold that of milk fat resulting in protein being the most important component of milk in determining the return to the producer. Overtime the payment for protein in milk is expected to increase. The mid-season period of June, July and August, accounts for 36% of the total annual milk intake (Irish Dairy Board). Therefore improved understanding of the factors causing variation in herd milk protein contents during this time would have considerable economic benefit.

Many dietary factors such as energy intake, lipid intake, starch and sugar in the diet, amino acid supply and forage type have been shown to modulate milk protein content but the potential to control these factors in a grass based system of milk production may be limited. In particular, cost effective strategies need to be developed to overcome the apparently low protein content of mid-summer milk. The objective of this study was to determine how grass composition and management factors were associated with milk protein content on commercial dairy farms in the mid-season period of June, July and August.

Investigation of milk protein concentration during mid-season

A survey of 45 commercial dairy farms across the country was undertaken in 2005 to investigate the relationship between grass quality and milk protein during this time. These farms were either monitor farms and/or members of a discussion group.

Farms were visited on three occasions in June, July and August, and grass samples representative of herbage being offered to the herd were collected. These samples were analysed for organic matter digestibility, neutral detergent fibre (NDF) and crude protein content. Herd milk protein concentration for the week of grass sampling was obtained from the milk processor, while data on genetic merit and calving pattern of the herds was provided through the ICBF HerdPlus Service. Details of the performance of the participating farms during the trial period are outlined in Table 1.

Table 1: Performance characteristics of participating farms

	Mean	**Max**	**Min**
Milk Yield (L)	23.1	33.5	18.0
Protein %	3.33	3.57	3.10
EBI (€)	32	52	15
PD Protein %	0.03	0.06	-0.01
Median Calving Date	Feb 24	Mar 29	Feb 11
Digestibility %	82	86	75
NDF %	42	51	35
Crude Protein %	20	27	12

The results of the study showed that milk protein content in mid-season was affected by 3 factors:

1. The genetic merit of the herd for milk protein content
2. The digestibility of the grass offered
3. The median calving date of the herd

The importance of these factors is emphasized by the example in Table 2. In this instance, Herd 1 is grazing a sward of higher digestibility, has an earlier mean calving date and a higher genetic merit for protein concentration, and has markedly higher milk protein concentration than Herd 2. The difference in terms of milk protein content between the two herds is almost 0.2% i.e. 3.39% versus 3.2%. Genetic merit for protein content accounts for over half of the difference between the two herds. Digestibility of the grass offered accounts for over 33% of the difference in protein content and the remainder is due to calving date.

0.1% = Genetic Merit

Difference in Herd protein% = 0.19% → **0.06% = Grass Digestibility**

0.03% = Calving Date

Table 2: Effect of calving date, genetic merit for protein content and grass quality on mid-season milk protein concentration

	Mean Calving Date	**PD Protein (%)**	**Grass OMD (%)**	**Milk Protein Concentration (%)**
Herd 1	Feb 28th	+ 0.06	84	***3.39***
Herd 2	March 10th	+ 0.01	77	***3.20***

Milk protein concentration was not influenced by the crude protein content of the grass. In addition, based on the quantity of grass left after grazing, the quantity of grass offered was not limiting. i.e. grass intake was not limited.

The current study highlights the importance of:

1. Maintaining sward quality during mid-season for maximising milk protein concentration.

- Monitoring farm grass cover at least once per week will assist management by early identification of surpluses and deficits.

- Rotation length should be 17-20 days during the mid-season
- Target pre-grazing yields of 1400 to 1600 kg DM/ha with high green leaf content to maximise animal performance. Excessively high pre-grazing yields (over 2000 kg DM/cow/day) should not be grazed, but instead conserved as silage.
- Silage conservation and topping should be used as management tools to correct pasture quality.
- Graze to a post grazing height of 4 - 4.5 cm (plate height).
- Choose late heading varieties when reseeding.

2. Utilising the ICBF EBI Herd Report in choosing sires for your breeding program.

- From the ICBF EBI Herd Report, establish the PD for Protein % for the overall herd and make sure the team of sires is well above this figure.
- Similarly choose a team of sires that are above the overall herd PD for protein kg.
- To ensure that the cows entering the herd in the future will calve early, you must also choose a team of sires that are strong in calving interval and are well below the overall PD of the herd for calving interval.
- Crossbreeding when used correctly, will improve the yield and content of milk protein.

Summary and Conclusions

- Milk protein concentration typically declines or remains static during mid-season for spring calving dairy herds. This is associated with a reduction in grass digestibility, resulting from increased fibre content in the sward. Pasture management strategies designed to maintain mid-season grass quality should be employed to sustain milk production and milk protein concentration during this time.
- Consideration must also be given to the influence of factors such as calving pattern and herd genetics on mid-season milk protein concentration. Utilising the ICBF EBI Herd Report to establish where your herd is at and then choosing a team of bulls to improve upon this base is essential.

Acknowledgements

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Overcoming Mastitis

Don Crowley, Tom Weldon, Ger McMahon, Teagasc, Farranlea Road, Cork

Summary

To overcome an outbreak of clinical mastitis or to control a high SCC level the following approach has proved very successful.

1. Stop spread of infection i.e. pre spray and dry wipe, wear gloves and spray gloves regularly, disinfect clusters between milkings by dipping clusters in per acetic acid solution. 10mls of serpent to 2 gallons of water and change after 10 dips.
2. Cell count all cows every 3 weeks for 3 times.
3. Carry out a culture on 3 problem cows and 1 sample from bulk tank.
4. Get milking parlour serviced.
5. Get your milking routine accessed and cow teat condition scored.
6. Cull chronic infected cows.
7. Carry out an aggressive dry cow routine.
8. Once Cell count comes good mind, it post spraying is crucial and pre spray problem cows.

During the course of the last 3 years we have carried out many farm visits, we would like to thank all the farmers we have visited for their co-operation and dedication. We would also like to thank all the Dairygold Staff and Teagasc Staff for their support over the years.

There is a solution, it takes effort and dedication but the rewards are significant. There is help available don't feel isolated.

Introduction

In May 2005 Dairygold in conjunction with Teagasc initiated a joint program on milk quality. The objectives of the program were that two Teagasc milk quality specialists work inconjuntion with the Dairygold milk quality team to reduce the incidence of mastitis and reduce on farm cell counts. The aim of the program is to make farms more profitable and deliver a higher quantity of high quality milk for processing.

Mastitis control is an ongoing challenge in modern day Dairy farming irrespective of herd size and calving pattern. Prevention and control of spread of infection are critical mechanisms to minimize the impact mastitis organisms have on your herd. No two farms are the same, general control measures can be implemented, until the specific problem can be identified.

Individual cell count records are critical to controlling and monitoring the performance of your herd from an SCC point of view. Control the spread of the infection; identify the bacteria involved, identify the cause of the infection, e.g. milking practices, teat preparation, milking parlour functioning, housing facilities. Implement good infection control and dry cow therapy program.

Costs:

When dealing with an on farm mastitis investigation it is very important to establish the cost an infection is having on herd performance.

Table 1: The Influence of SCC on Lactation Loss

SCC	Linear Score	Milk Loss for 1st Lactation	Milk Loss for Subsequent Lactation
SCC 25,000	1	0	0
SCC 50,000	2	0	0
SCC 100,000	3	88kgs	176kgs
SCC 200,000	4	176kgs	352kgs
SCC 400,000	5	264kgs	529kgs

Example milk production loss for herd of 100 cows (25% 1st lactation) having average bulk milk SCC of 200,000 cells/mls v100,000 cells/mls.

25 1st lactation* 88 kgs = 2,200 kgs

75 older cows * 176 kgs = 13,200 kgs

Total loss = 15,400 kgs

Other losses associated with sub- clinical mastitis include occasional lactation therapy with antibiotics + related losses and culling of chronic cows.

1. For every increase of 50,000 in cell count over 100,000 a 2.5% drop in milk yield occurs.

2. On average an infected cow will have 1.6 cases of clinical mastitis in the year.

3. The costs associated with a severe case of clinical mastitis comes to €590.00

   This cost includes all the hidden costs of mastitis.

4. Costs of Mastitis

6 tubes @ €3.00 per tube	€18.00
1* 100mls injectable Antibiotic	€20.00
7days*25 litres*.30cent/litre	€52.50

Associated costs, higher culling rate, milk yield loss etc

On Farm Investigations

We have dealt with 3 scenarios over the years we have worked on this program

Scenario 1. A farmer experiencing high cell count but no cases or very few cases of clinical mastitis

Scenario 2. A farmer with a cell count of 150,000 to 250, 000, experiencing a high incidence of clinical mastitis.

Scenario 3. A very low cell count herd i.e. <100,000 and experiencing a high level of E.coli mastitis.

The costs of mastitis in dairy herds are very significant.

To tackle a mastitis problem the following information is required:

1. SCC records at least 3 recordings 3 weeks apart. Milk recording data in conjunction with herd plus is a Key component to tackling a SCC problem. It gives a great insight into what has been happening on the farm.
2. Treatment records. Tube usage, number of reoccurring cases etc.

3. Bacterial Identification.
4. Examination and scoring of cow teat condition.
5. Detailed milking machine service report.
6. Analysis of milking routines.
7. Housing facilities, road ways and collection yards.
8. Robust treatment regime for both the lactating and dry period.

Bacterial Challenge and Identification

Mastitis occurs when the udder becomes inflamed because leukocytes are released into the mammary gland in response to invasion of the teat canal, usually by bacteria. These bacteria multiply and produce toxins that cause injury to milk secreting tissue and various ducts throughout the mammary gland. Elevated leukocytes, or somatic cells, cause a reduction in milk production and alter milk composition. These changes in turn adversely affect quality and quantity of dairy products.

Over coming mastitis is a multi factorial issue. Mastitis can present itself in three forms clinical, sub- clinical and chronic mastitis.

1. Clinical mastitis cases, clots are present with an inflammation of the quarter, a raised cell count generally associated with this condition.
2. Sub- clinical mastitis exhibits no visual difference in consistency of milk, but a high cell count is present.
3. Chronic Mastitis: an inflammatory response that lasts for months and runs from lactation to lactation. It is usually sub-clinical with flare ups of clinical mastitis from time to time.

These conditions result primarily from invasion of bacteria through the teat canal. The teat canal is the first line of defence against infection. A sphincter muscle surrounds the teat canal; this muscle prevents milk from leaking and prevents bacteria entering the teat canal. Between the milking intervals the cells lining the teat canal produce keratin which has bacteriostatic properties and forms a barrier against bacteria.

Teat End damage and Natural Defence Mechanism:

The understanding of the cows' defence mechanism is important to enable control and prevent new infection and mastitis.

To overcome mastitis, the identification of the problematic agent is significant to help point us in the direction of possible cause. These bacteria can be divided into 2 categories; Environmental Bacteria i.e. Strep Uberis, E.Coli and Strep Dysgalactiae and Contagious Bacteria i.e. Staph aureus, Strep agalactiae.

Environmental bacteria as the name suggests originate primarily from the environment. Infection is picked up from the environment i.e. poor housing bedding, manure, dirty road ways, common clothes and poor teat preparation are prime examples.

Contagious Bacteria are pathogens primarily spread during the milking routine. Infection is spread from infected cows to clean cows via common clothes, milker's hands and infected liners are the main areas.

In addressing a mastitis problem the first area to assess is the teat opening and general skin condition. A general check on teat condition is required i.e. signs of odema, tenderness and uneasiness in cows when the cluster is removed. The teat opening is scored based on the degree of damage caused to the teat end during the milking procedure, this condition is called hyperkeratosis. The condition of the teat is scored based on a score card from 1 to 5

1 = Perfect or normal appearance, no ring evident on teat opening

3 = Moderate hyperkeratosis, few rough projections from teat opening, smooth slightly rough ring.

5 = Advanced protrusion; sphincter appears to be turned inside out, very rough teat end, flowered head at opening of teat.

The teat end serves as the body's first line of defense against infection. A smooth muscled sphincter, which surrounds the teat canal, functions to keep the teat canal closed, prevents milk from escaping, and prevents bacteria from entering the teat. The cells lining the teat canal produce keratin, a fibrous protein with lipid components (long chain fatty acids) that have bacteriostatic properties. This keratin forms a barrier against bacteria. During milking, bacteria may be present near the opening of the teat canal, either through dirty and wet conditions at the teat end, through teat end lesions or colonization, on contaminated surfaces of milking units (liners or claws), or cow prep procedures. Trauma to the teat renders it more susceptible to bacterial invasion, colonization, and infection because of damage to keratin or mucous membranes lining the teat sinus. The canal of a damaged teat may remain partially open.

There are a number of areas that affect teat end condition.

1. Over milking
2. Excessive Vacuum
3. Faulty pulsation
4. Removing clusters under vacuum
5. Blocked air bleeds.

Once established what bacteria is the causative agent and teat ends have been assessed, stopping the spread of infection is crucial. To aid this process a thorough teat preparation program and disinfection program of liners is essential**. Pre spray** or pre dip all teats prior to milking and dry wipe with a paper towel, apply clusters, on removal of **clusters dip clusters in a per acetic acid solution**(e.g. serpent) change after 12 dips and apply to next cow. Post spray/dip all cows post milking. This process minimizes the transfer of infection and we have achieved significant progress on farm level in stopping clinical mastitis and dropping herd cell counts.

Once the spread of infection has been curtailed diagnosis of cause is the next step. A detailed look at milking equipment is required.

Milking Equipment:

Areas of common concern:

		Target Level
1.	Vacuum level	48 kpa

Excessive vacuum is a common problem due to faulty regulators and inaccurate vacuum clocks.

2.	Pulsation Ratio	68:32 or 65:35
3.	Pulsation Rate	55 to 60 pulse per min
4.	D phase	>20%

The rest phase of the pulsation cycle should be greater than 20% of the cycle.

5. Adequate vacuum reserve

   This is an inability of the vacuum pump to maintain a stable vacuum when applying or removing clusters. Inadequate reserve is a common occurrence where extensions to plant have occurred and vacuum pumps have not increased proportionately.

6. Flooding of receiver jar.

   Occurs with diaphragm pumps, has a major impact on teat end vacuum.

7. Slope in milk line inadequate 1:60

   Very common fault in milking parlours should have a constant even fall to the receiver jar.

8. Milk entries not in top third of milk line.
9. Poor cluster alignment
10. Liner slip.
11. Frayed or damaged rubber fittings and liners.

Milking Practices

Milking procedures vary widely from farm to farm and from our on farm investigation have a significant effect on mastitis incidence. We have noticed a wide variation in milking practices and routines which have a dramatic effect on SCC levels in a herd.

1. Poor teat preparation.
   No preparation of dirty cows or no pre-spraying of infected cows.

2. No infection control, infection spreading from cow to cow during milking process.

3. Taking clusters off under vacuum.
   Buttons faulty or air admission holes blocked.

4. Under milking of cows.
   Due to use of old liners, poor vacuum or poor pulsation settings.

5. Over milking of cows.
   A common problem in large parlours with no cluster removers. It is quiet common in small parlours that are poorly designed.

6. Poor fore milking technique.
   No gloves worn and spreading infection from cow to cow via hands. Gloves should be sprayed with a teat spray before fore milking cows.

7. Poor post milking spraying.
   15 mls per cow per milking should be used with a drop of teat disinfectant visible at the end of the teat. Poor equipment with damaged nozzles and poor pressure will not give adequate cover.

Milking practices contribute significantly to mastitis spread and infection within a herd.

Treatment of Mastitis:

Treatment of clinical and sub clinical mastitis during the lactation period can be very varied. In many instances response to treatment can be only for a short period of time, thus you see fluctuating cell counts from month to month.

For many cases treatment of Staph aureus infections will require treatment with injectable antibiotics in conjunction with intra mammary infusions.

For the majority of farmers, getting a clinical cure is not an issue i.e. the clots disappear; getting a sub-clinical cure is a lot more problematic. We have found where farmers have used the CMT test kit to monitor treatment regimes and continued treatment for a longer period a clinical cure and sub-clinical cure have been achieved.

Dry cow therapy can have a dramatic effect of somatic cell counts in dairy herds. This is significant opportunity to administer long acting antibiotics with or without a sealer to kill infections within a quarter. Intramammary infusions can last up to 54 days post insertion.

We have achieved very good results where cows have been CMT tested prior to drying off and problem quarters individually treated prior to dry cow therapy.

The response to treatment can be as low as 50% cure rate for staph aureus infections. With such a poor response to treatment in the lactating period, controlling the spread of infection and preventing new infection is the key to maintain a low SCC herd.

Why I became a Dairy Farmer

Matt and Trish Hennessy, Fethard, Co. Tipperary

Summary

- In 2006 we started dairy farming. We converted our farm from drystock (400 ewes and 100 sucklers) to a 100 cow dairy enterprise. Our aim was to get a decent income from farming together with a good work life balance.

- Since converting our farming income has increased sevenfold. Dairy farming is also providing a great home life and gives plenty of opportunity to spend time with the family and children.

- We are very happy with the decision we made and look forward to the future.

Contents:

- **Why** we switched to Dairy Farming
- **How** we went about it and our progress to date
- **When** we look back and when we look at today
- **Where** we would like to be in 5 years

Why we switched to Dairy Farming

The year 2005 was the beginning of a new era. Freedom to farm was here in the guise of the Single Farm Payment. We were no longer required to rent land or carry stock to receive premia, our farm enterprises had to stand on their own. That year we examined our situation very closely. Results for us were disappointing. We considered ourselves as fairly good dry stock farmers putting in a lot of hard work on 53ha of owned land and 40 ha leased. We had two main enterprises, 400 ewes and 100 suckler cows. Yet our margin excluding premia was under €10,000. This kind of return was just not good enough. The birth of our daughter in June was the trigger for change; we had to look at securing a viable income for our family and our future.

Expansion in drystock was not an option with such low returns especially with labour stretched to the limits. We only had two options left.

1. To go part time, but this was the last resort as we really wanted to remain farming fulltime.
2. Time to look outside the box.

For us Dairy Farming ticked all the boxes, the lifestyle we wanted, the family time to be with our children, being our own boss, remaining in full time farming and a decent income to provide for our family.

How we went about it and our progress to date

Fortunately for us while we were weighing our options so was my father in law and he had taken the decision to exit dairying. It was now September 2005 and we had 4 months to sell off existing livestock and get a dairy infrastructure into place. We looked at a green field site option. However, we felt that existing buildings would be wasted and we started to look at the possibility of converting existing sheds in the yard. We converted half of an existing 3 bay A roof building in to a 12 unit parlour with automatic feeders, manual stalls on a 2'2'' spacing and a collection a yard with a 12,000 gallon slatted tank at the back. The other side of the shed was converted into a dairy and a 1,800 gallon bulk tank installed.

Our next hurdle was accommodation which took the most imagination. We had an existing 6 span slatted unit, double slat shed with a 15 foot central feed passage. Accommodation was needed to house 120 cows. There was ample slurry storage but floor-space was a problem

The decision was made to extend an 18 foot covered feeding area with automatic scrapers with 15 foot feeding passage each side. We put 48 cubicles head to head on the existing feeding passage and 36 cubicles head to head on the slats on both sides, housing 120 cubicles in total.

Initially 1km of roadways was put down to access our existing paddocks which we felt was essential. A further 1km has been added since.

Grassland

We began grass measurement in 2007 with a clippers and scales. It quickly highlighted 22 acres that were in need of immediate reseeding with a further 8 acres being reseeded in August 2007. Although costly we believe that a reseeding program on a diary farm is essential especially now with higher input costs.

This year's grass measurement shows the reseeded paddocks growing 100kgs per day while older pastures struggling at 40kgs per day.

Table 1: Fertilizer usage in 2008

Months	**Units/acre**
February-March	30
April	23
August	40

We feel that through both our reseeding program and tighter grassland management that we have been able to cut our concentrates feed by 200kg per cow. Our aim is to cut this further as more reseeded ground comes into the system.

Grazing season

Cows were out until December 7th 2007 and were back out full time as they calved from February 6th 2008. Due to wet conditions cows were housed at night from 26th October and we plan to have the cows out by day until December 1st. Paddocks have been closed from 8th October this year with 60% closed by November 1st with the remaining 40% to be closed between 1st November and 1st December. Planned turn out for cows and replacement heifers in 2009 is February.

Cows

Originally 40 British Friesians and 25 Holstein Friesian cows were purchased with more emphasis on bio security than on EBI, which currently stands at €67. We started DIY milk recording in 2006 and have continued to do so. The information coming back has formed our breeding policy with a belief that high EBI bulls are essential. For example, the top 10 EBI cows in the herd have produced 455 kgs milk solids by October 14th this year compared to 395kgs for the lowest 10 cows. They will also calve earlier next year and have a lower empty rate. See table 2.

Table 2: Performance of top and bottom 10 EBI cows in the herd

	Average EBI	Yield kgs/solids to 14th October 2008	Days In Milk	Estimated Calving Date	Empty rate
Top 10 EBI cows	127	455	228	10/03/09	20%
Bottom 10 EBI cows	1	395	196	25/03/09	40%

The number of cows bred to replacement AI has increased since we started dairying, this year there were 65 calving to AI replacement sires. See table 3.

Table 3: Number of cows calving to AI bred replacement sires

	2006	2007	2008
Number of cows calving to A.I. replacement sires	15	25	65

The breeding focus is now on high EBI sires with a good fertility sub-index Straws have been purchased for 2009, with an EBI of €167 (€72 fertility sub index). See table 4

Table 4: Straws purchased for use in 2009

Code	EBI	Fertility Sub Index
GIO	195	84
OMAN	245	77
RMW	147	76
TKY	153	68
OOK	174	63
Average	**167**	**72**

Profit Monitor: Our 2007 profit monitor showed a yield of 419kgs/ms/cow with a common profit of 17.4c/litre. This has delivered a sevenfold increase in net profit compared to drystock income in 2005. Gross output in 2008 should be higher due to lower purchases of breeding stock. Concentrates usage is reduced from 700kgs to 500kg, but overall cost will be about the same due to higher cost per ton. Fertiliser usage is also down, but cost will be similar due to higher cost per ton. Overall variable cost will be about the same and fixed costs down about 10% in 2008.

When we look back and when we look at today

In the last 3 years since we started we have had our ups and downs and have had a very steep learning curve. We have benefited greatly from joining the Suir Valley discussion group in January 2006. Being part of the group has allowed us to gain a wealth of experience and the discussions are guaranteed to keep you on your toes. We have made our mistakes and no doubt we will make some more into the future. It is what you take from your mistakes that will take you forward.

Our aim for a decent income together with a good work life balance is coming together. Dairy farming provides a great home life, time for family, now two children since the arrival of our new little milkman in January! It is something hard to put into words. We are very happy with the decision we made and look forward to the future.

Where we would like to be in 5 years

- Grass based 100 cow spring calving system selling bull calves at 2 weeks or less.
- All replacements bred on the farm
- A target herd EBI of over €100 with a fertility sub index of €65-70,
- Milk solids of 450kg/cow
- More compact calving
- Complete reseeding of the remainder of farm
- Reduce costs through grass budgeting/measuring
- Lower feed inputs to 400kg/cow or less
- A.I. for first six weeks hopefully covering 75-80% of cows
- Calving spread of 12 weeks
- Operate a completely closed herd

The farm is currently spilt by a public road, 35 ha on milking platform and 18ha across the road. Time will tell whether a tunnel will be an option allowing us to bring the entire farm into the milking platform and milk 130-150 cows, getting replacements reared on contract.

My Strategy to Controlling Farm Costs

Damien & Kathleen McEntee, Magheracloone, Co Monaghan

Summary

- No business can be run successfully without knowing its cost base. This is essential in modern dairy farming in order to survive and have a sustainable dairy enterprise without over reliance on subsidies.
- In this paper I discuss my approach to costs, what I believe are the key drivers in a low cost system and my strategy to keep costs down.

Introduction

We are farming at a time where milk prices are more volatile and increasing costs are eroding overall profit. With the price of milk out of our control, we as farmers must stay in control of our costs. In order to achieve this we must know our costs, know what contributes to having low costs and make the correct decisions to invest in areas of our business which will yield returns in monetary terms.

I currently farm 42.5 hectares which is all available as grazing for the dairy herd. This year 80 cows are being milked. My average EBI is €78 with a milk sub index (SI) of €43 and fertility SI of €30. The herd produced 403 kg milk solids per cow in 2007 at 3.49% protein and 3.90% fat.

This year an additional 22 hectares have been leased which is adjacent to the milking platform. It will be available for grazing next spring. Next year 140 cows will be milked; the plan is to milk 190 cows by 2012.

1. <u>CONTROL COSTS</u>

To control your costs you must know what your production costs are and understand how your decisions affect your bottom line. To get to a position where I can see what my costs are I follow a five stage process

- **RECORD**
- **MONITOR**
- **BENCHMARK**

- **QUESTION**
- **ACTION**

Record

I use the IFC farm accounts package to record all my transactions. This is a simple operation once it's set up. I enter all milk and stock sales and purchases from my cheque book on a monthly basis. This enables me to track income and costs on a monthly basis and take any remedial action early.

Monitor

When all this information is collected it builds a picture of my financial performance for each year. At any stage during the year I can check as to how it compares with the previous years accounts for the same period. At the end of the year I print off my e-profit monitor input sheet and send it my Teagasc advisor to get my profit monitor formulated.

Table 1 outlines my costs and profits for 2007.

Table 1: Costs and profits from 2007 e-Profit Monitor

	My Cpl (€/kg MS)	**Top 5% Cpl**
Co-op Milk Price	35.1 (4.47)	35.25
Total Dairy Output	35.37 (4.64)	36.82
Feed	2.59	2.00
Fertiliser	1.67	1.59
Vet	0.56	0.74
AI	0.63	0.49
Contractor	1.14	1.31
Other variable costs	1.23	1.21
Machinery	0.22	0.91
Car, ESB, Phone	1.08	0.91
Depreciation	0.87	0.96
Other Fixed Costs	1.33	1.03
Common Cost	**11.49 (1.51)**	**11.15**
Common Profit	23.88 (3.13)	24.97

Benchmark

I am involved with two discussion groups and in February we sit down with detailed reports of all members profit monitors. Each member gets a chance to discuss both their own costs and profits and also those of all other group members. This is very important exercise because I know these farms and have first hand knowledge where the figures are coming from e.g. cow type, soil type, stocking rate etc. Finally I believe in benchmarking against the best so I compare my figures against the top 5% in the country on costs, this allows me to see what individual costing can be improved upon. (table 1). In 2007 my common costs were 0.34cpl higher than the average of the top 5% of spring milk Teagasc Profit Monitors completed.

Question

When all this is done I question others on particular costs and how they have been achieved. This is one major benefit of discussion group membership. I also try and visit other farms where farm walks are held and use these to challenge myself on all aspects of my farm. Farmers who complete profit monitors are usually very open about their costs and willing to discuss how improvements can be made. My big challenge is to maintain my common costs per litre at 11.5 cent per litre (€1.50/kg MS) as I expand going forward.

Action

To complete the process I turn my focus to the year ahead. I set out targets for the year and a plan to achieve these targets.

One target for 2008 was to reduce meal costs to 2c/litre. Looking back over '07 figures to see when meal was purchased I found that a lot of meal was fed in September/October. I thought this was justified at the time with the higher milk prices. But on closer inspection of my weekly grass measurements I had failed to build up adequate grass for that time which would have reduced the need for this level of meal feeding. So in order for me to reach my target for I did some simple calculations

Planned meal feeding 2008:

Milk supplied 2008: cows (80) multiplied by litres sold (5,457) = 436,560 litres

Meal bill: target meal feeding (0.2 cpl) multiplied by litres sold (436,560) = €8,731

Meal usage: meal purchased (€8,731) divided by average price/ton (€265) = 33 tons

Meal per cow: tons (33) divided by cows (80) = 412kgs per cow

I then break it down monthly

Feb	Mar	Apr	May – Aug	Sept	0ct	Nov	Dec
3kgs	3kgs	2kgs	0	1kg	2kg	2kg	dry

This target of 412kgs gives me some tolerance. I can reduce meal from the monthly figures if conditions allow. This will give the option of feeding additional meal to cover for bad weather or short-falls of grass.

Profit Monitor – drives low costs and high profit.

2. <u>KEY DRIVERS FOR LOW COST.</u>

- **Myself**
- **Grass**
- **Cows**

There are several other factors which could be included but there is no need to complicate something so simple.

Myself

This is the most important one. If the position of dairy farmer was to be advertised in print media it would probably take up half a page with skills required such as milker, machine operator, fitter, secretary, bookkeeper, herdsman, manager etc. Realistically I can't be good at all these so I need to focus on the ones that deliver my salary. If I have the right attitude towards change with a willingness to learn and the determination to succeed I can hold my position of manager without having to try and juggle the other positions all of the time. This would leave more free time for family and other interests outside of farming.

Grass

I have only come to terms with the full potential of grass in last couple of years. When grass measurement was introduced to me in 2005 by Frank Kelly and Brendan Horan as part of a northern farm research program it took time to learn the skill. But I soon realised that with figures I could predict short-falls and surpluses. This allowed me to feed some meal for a short period or take out paddocks before they get to strong. Prior to this it was either a feast or a famine, trying to graze out heavy covers or just running out of grass which resulted in lower milk solids and higher meal costs.

My grassland management plan starts each autumn. I get a budget from my Teagasc advisor that tells me what my closing cover in autumn must be. The following year grass is measured grass weekly, I stuck with the budget using the grass wedge as a guide to decided what action was needed on a weekly basis e.g. remove paddocks for bales, bring more stock on to the dairy platform or feeding supplement, reduce stocking rate by removing animals or increasing the platform by bringing in more ground.

I believe grass management is a key driver for a low cost system, I have reduced contractor and machinery cost with shorter winters indoors resulting in less slurry stored and lower silage requirements. But the big savings have come on meal and fertilizer. Cows out full time in early February and therefore meal is kept to a minimum. It is cut out by the end of April and isn't brought back in until September unless there is a grass deficit. Fertilizer spreading is matched to stocking rate and slurry usage is maximised.

Cows

My objective here is to breed a cow that will produce high milk solids with good fertility to take full advantage of spring grass. Grass is the number one feed driving milk solids and putting condition on the cow.

I aim to achieve compact spring calving. My aim is to reach 90% of cows calving in the first 6 weeks of the calving season. This will help me increase utilisation of my cheapest feed source – grazed grass. In 2009 I will calve down 83% of my herd in 6 weeks (from 1st February to 14th March). I feel I can further improve this through maintaining high heat detection rate and further increase herd fertility sub-index.

With this type of cow and compact calving I will be able to keep my veterinary cost down by getting more cows out earlier because calved cows are far healthier outside. Fertile cows also lower replacement costs e.g. less AI straws, less scans, less veterinary treatments and less heifers need to be reared (or surplus heifers sold).

Key driver - keep it simple

3. STRATEGY TO KEEP COSTS LOW

- **Better management**
- **Increase Output**
- **Financial plan**
- **Keep focussed**

Better management

Better management is all about keeping up to date with new research, embracing new technology and retraining myself with new skills required. We have excellent research farms which are pushing high output high profit systems of milk production. We must use grass and financial measurement together with milk recording, EBI and ICBF reports to minimise cost and maximise profit. We must also use farm walks, conferences and discussion group meetings to develop our skills.

My plan is to increase herd EBI by €5 each year, increase grass utilised per hectare from 9.5 tonnes to 11.5 tonnes and produce 1,200 kgs milk solids per hectare from my new milking platform of 64ha.

My grass based system will keep variable costs low.

Increase output

This is an area where I believe there is significant room for improvement, especially with processors finally moving towards payment on solids production. More milk solids will be sold from my farm by continuing breeding for increases in constituents i.e. (butterfat and protein) and fertility. Mature cows that calve compactly will deliver more milk solids.

The second part of increased output is higher stocking rates. I aim to take all non milking stock off the dairy platform by contract rearing heifers. Stocking rate will be pushed to 3 LU/ha. This is being achieved on many farms already. In order to get my farm ready for this a major reseeding program is in place. Six hectares were reseeded this year in addition to the 22 hectares leased.

Increasing output over the next 5 years will dilute my fixed costs on the farm.

Financial plan

If you want to focus on low costs you must have targets and a plan to achieve these targets.

Four years ago when I was milking 50 cows my meal costs were 3.38 cpl, this cost is now 2.59 cpl and 80 cows are milked. This is a saving of almost €50 per cow. This was a deliberate decision to get more grass into the cow's diet and replace meal. As stated already – the plan for 2008 is to reduce this to 2 cpl.

The situation is similar with other inputs. In the past I make a shopping list at the start of the year e.g. dry cow tubes, dosing and vaccines. A number of suppliers were contacted to get quotes. I found purchasing at the last minute can be quite costly. Now I rely on a well run purchasing group in my area to do this job. This is an excellent way to reduce cost as suppliers quote on the basis of getting business from 30-40 members. It frees up time for more important work areas.

Keep focussed

I have a cost structure in place that is delivering high profit. I intend to expand over the coming years by replicating what I am doing already - there is no need to make a simple system complicated.

I do not intend spending my hard earned money on something that not only depreciates but doesn't give me any return on investment. I am not depending on someone else to tell me what my profit and tax liabilities will be - with proper records and a well prepared plan I will know this as the year progresses.

Key driver - Have a plan and stick to it.

My Cost Effective Farm Expansion Plans

John and Patrick Hickey, Ardnacraney, Tang, Co.Westmeath

Summary

- Bought and set up new dairy farm at a cost €40,000/hectare.
- Target to operate low cost, high output compact spring calving system with the objective to maximise overall profitability on the farm.
- Over a 3 year period have increased stocking rate from 2.1 to 2.7 cows/ha increasing common profit from €1400 to €2750 /ha.
- In 2009 we intend to increase stocking rate to 3.3 cows per hectare. Based on current predicted milk price of €3.90 per kg milk solids (26 c/L), we envisage a 15% drop in common profits. Without increasing stocking rate our common profit would drop by 25%.

Introduction

We purchased Ardnacraney farm at public auction on the 8th Sept. '05 for a cost of €3.5 million. The farm ran to 103 ha (255 acres) and there was a milk quota of 940,000L (207,000 gls) attached. Previous to this, we had been working in partnership on the home farm in Kilkenny which is 170 ha in size and at the time carried 180 cows milking in two parlours, replacement heifers and all male cattle to beef. We had been looking to expand in dairying and Ardnacraney had numerous advantages. Although the farm was previously run as a liquid milk herd it had recently begun to supply Connacht Gold, giving greater access to quota. In the 1'st year we transferred the entire quota to Connacht Gold. The farm was in one complete block, a big advantage with dairying and land price was also lower here, than in southern parts of the country.

Expansion Plans

Ardnacraney was bought with the plan to develop it into a low cost compact spring calving milking block, carrying 300 milking cows. To achieve this goal it would be necessary to invest quite substantially in infrastructure for the farm. However as we had large financial commitments and constraints, we set about doing this in a cost effective and step by step manner.

We had a parlour (albeit a poor one, 10 by 10 double on which we spent €5,000 getting ready to milk) a 12,000litre milk tank, cubicle accommodation for 220 animals, plenty of loose housing for calving/calves etc but we couldn't commence milking without cows. We had 80 surplus milking stock from Kilkenny and over the 3 months between buying and taking possession of the farm we bought 140 dairy stock, 100 of which were heifers. We bought with some criteria in mind but cost was a major factor. The milking herd arrived in Ardnacraney at an average cost delivered of €1,100.

As already mentioned the milking parlour was a stop gap solution and from day one we were planning the erection of a large, low cost, herring bone parlour which would be more centrally located on the farm. It still surprises me that one of the most commonly asked questions is why we didn't do this before starting. Certainly, it would have been a lot easier to develop the farm without trying to manage a herd of cows on it and reach certain targets, but the downside is, it would have put the system under a bigger financial strain. It allowed us to build up cow numbers gradually, and considering the problems we've seen and the experience we've gained this has to be seen as beneficial. Also, the FWM and FIP schemes were announced and as a young farmer in a disadvantaged area it was decided to take full advantage of both. However, this slowed down completion considerably.

Development Year 1 (2006)

There was 16 ha of maize growing on the farm. This was reseeded in April '06 it was power harrowed twice, sown and rolled. No clover was added, and in hindsight this was a mistake as this ground is very deficient in nitrogen and is only reaching peak performance this year. Another 25 ha of the farm was sprayed with Round-up prior to 1st cut silage. After five days the silage was cut, the ground was harrowed twice and then sowed. We carried out the work ourselves. As the farm is over two kms long and land quality is mixed, a good roadway structure is essential. When we arrived all paddocks were extremely long and narrow, this made grazing in wet conditions difficult. With 300 cows in mind, we decided to go with, in the region of 30, 3 ha paddocks. All existing roadways were widened, and new roads laid. The roadways are now a minimum of 5 metres in width. Test holes were dug and gravel sufficient in quality and quantity was located. Over 1,800 metres of roadway was laid in year one at a cost of €40,000 for hire of machines. A further €10,000 was spent on removing ditches, reclamation, drainage etc.

Table 1: Capital investment in set-up of farm

Purchase farm	€3.5m
Cows	€250k
Milking Parlour	(€300k) €160k
Roadway & ditches	€65k
Reseeding	€12k
Water	€10k
Machinery	€40k
Quota	€50K
Total	€4087K

Development Year 2(2007):

Stocking rate increased to 2.4 cows/ha. A further 8 ha was drained and reseeded. We commenced building a new dwelling house on 12th April. It was completed in time for my wedding to Elaine on August 25th

We started to upgrade the water system. The farm was been serviced by a ¾ inch pipe. This has been upgraded to 1 ½ inch mainline with 1 ¼ inch servicing 300 gls troughs, which are centrally located in paddocks. As all water is presently been pumped, we thought this was both risky and expensive. This year a 90,000 litre concrete tank was constructed. We plan to pump water to this tank by night and gravity flow back by day. This will also give us 2-3 days storage should a problem arise with pump, piping etc. The cost of the system (piping, tanks etc) is in excess of €12,000. Construction of the new milking facilities finally commenced.

Development Year 3(2008)

Stocking rate increased to 2.7 cows/ha and further 6 ha reseeded. We finally commenced milking in the new parlour on 1st September ‘08. We went for a 30 unit herring bone with 2’6’’ centres and we installed a De Laval plant with automatic washing. We also installed a Duovac system, which I’m very happy with. This allows one person to milk without any pressure and cell count has dropped considerably since moving. A 20,000 L direct expansion milk tank, an industrial plate cooler, an Alfco drafting system and I.D.S low cost feeders were also fitted. The collecting yard is flood washed which is working well! The total cost of the new facilities will be €160,000 net of grant (€300,000 gross).

Table 2: Output and profitability of the farm over last 3 years and predicted for 2009 with or without further expansion.

	Cows Milked	MS/Cow	MS Produced	Milk Price/kg MS	Cost/ Kg MS	Margin/Kg MS	Common Profit	ROI (After Labour)
2006	213	368	78,384	€3.80	€1.97	€1.83	€143,443	2.52%
2007	242	375	90,750	€4.84	€1.80	€3.04	€275,880	6.75%
2008	271	370	100,270	€4.80	€2.10	€2.70	€270,584	6.62%
2009*	271	390	105,690	€3.90	2.00	€1.90	€200,811	3.93%
2010	330	400	132,000	€4.50	€2.00	€2.50	€330,000	7.10%

*2009 with expansion or without expansion

Performance 2008

At present we are carrying 275 cows and the labour input consists of myself and one worker, Robert Swierzc. Robert is from Poland, and is a great asset to the farm. Last winter we carried over 20 empties of our own plus 20 from the Kilkenny farm and calving commenced on the 5th February with 75% calved in six weeks. Lessons were learned (the hard way) this Spring in relation to closing date and finishing the first round! With 240 cows at grass full time by the end of March, 17th October is too late to start closing and ending the first round on the 1st April is too early. Grass budgeting is carried out every week throughout the grazing seasons, surplus grass is taken out as bales. As 20% of the land base is marginal, management during wet weather (the last two years!) is critical. Cows were at grass full time from calving 3 hrs on/ off grazing was practised day and night throughout March. However poor growth in April lead to a huge feed deficit (14th April, AFC 270kgs) 4kgs DM maize added to diet with over 80 tonnes fed. Looking at our costs meal feeding stands out! Excuses, weather wise are fine, but with price squeeze staring us in the face this must be addressed. Another way of combating price reduction is pushing output. We feel there is plenty of scope to drive output per cow. We aim to achieve this by compact calving, getting closer to 90% in six wks, by using high EBI sires with the emphasises on: fertility, ease of calving, protein % and kilos produced in that order. Last Spring sires used were Eckland, Jordainaire, Jiro and Kabul. On more extreme Holsteins we used Danish Jerseys DJX and DJY. Jersey crosses were served to Nautiluas. A.I. commenced on 28th April with a 23 day submission rate of 84%. This was our first year milking Jersey crosses with 1 empty out of 30 after 10 wks A.I and 4 wks with a stock bull. Across the whole herd we had 57% conception to 1st service. All of these figures can be improved upon to move us closer to 400kgs ms/cow.

Table 3: Profit monitor analysis for last 2 years on Ardnacraney farm

Year	**2006**	**2007**
Gross output (c/l)	28.11	36.67
Costs (c/l)		
Feed	2.94	3.34
Fertiliser	1.96	1.42
Veterinary	0.92	0.8
AI/breeding	0.51	0.75
Contractor	1.52	1.3
Other V. costs	1.69	0.54
Total V. costs	**9.54**	**8.15**
Machinery	0.72	0.80
Car/ESB/phone	0.69	0.78
Depreciation	0.64	0.86
Labour	2.17	1.61
Common costs	**12.62**	**12.01**
Common profit	**15.49**	**24.65**

Development Year 4 (2009), onwards

With the benefits of grass budgeting, the advantages of reseeding are obvious. To drive on stocking rate it will be necessary to have all paddocks on the farm producing 15 tonnes dry matter/ha average and not the exception, as we have seen this year. To do this, it will also necessitate acquiring some outside land/off wintering or B&B facilities. It would take the pressure of silage off the home block and in my opinion would make management much easier.

Why I am becoming a Dairy Farmer

Why I'm Changing From Suckling to Dairying

Patrick and Yvonne Stratford, Eighter, Virginia, Co Cavan

Summary

- I had been casually thinking about dairying as a future for a few years and last year decided to go for it. The decision was not easy: I have been suckling for 20 years, I have a well established herd and we enjoy a good living with lots of time off.

- Why am I doing this? A few reasons: I think the time is right, the decoupling of subsidies, the uncertain future of the SFP after 2013, the abolition of milk quotas, I have a suitable farm and I look forward to the challenge have all made my mind up.

- The last year has obviously caused me to think harder about making a change, with beef up 30% and milk down 30%. While I can't predict the future, I'm still confident low cost dairying has the brighter outlook.

Background

I'm farming a dry farm on the Cavan Meath border. I'm the wrong side of 35, married with three boys aged 6-9.

The farm is 84 Ha (210 acres) in one block, divided in two by Virginia – Oldcastle road.

Before the SFP, I had 180 Suckler Cows, selling weanlings, over 40 Ha rented and a FAB student full time. After the SFP came in, I joined REPS, stopped renting the land, reduced the cows to 120 and bought a quad bike instead of the student.

I thought I was practising good grassland management. The Teagasc "Cash in on Grass" program was launched on our farm over 10 years ago, and for 20 years the Suckler herd has gone to grass as they calved from 1st February. However a walk with Gary Nolan and some of the "Grazing Musketeers" showed the massive gap between Beef and Dairy grazing management.

I have to admit suckling has been very good to me in the past, and has given a good income, but this has been in the form of subsidies for as long as I can remember, and I became at least as good at paper farming as real farming. Thankfully this left me with a SFP greater than average.

Why I made this Decision?

Basically I wouldn't be going dairying if I didn't think the reward was in it!

Reasons to leave Suckling

- Without the SFP my income wouldn't keep a family going, and after 2013, although the SFP will probably continue in some form, it's going to be reduced through modulation, national averaging or whatever, leaving my income possibly halved?
- The SFP is now decoupled from production, so I'll get it regardless of what farming system I choose.
- I think beef faces an uncertain future from outside forces like Brazil, Argentina and Brussels, not to mention Dublin (halving of Suckler Cow Welfare Scheme).

Reasons to Start Dairying

- Mainly Dry Farm
- Large enough block of land
- Will suit grass based low cost spring calving system
- Quotas going 2015
- Security of SFP for another 5 years
- Excellent research and advice available
- Looking forward to challenge

Obstacles

1. **Age!**

I'm over 35, so last year that was a major problem, thankfully not anymore, as I had to buy a tiny bit of land with quota, build a tiny dairy, get inspected, supply a tiny bit of milk, get registered, then look for more quota!

2. Information

The main problem has been sifting through the endless "advice" everyone has given me! I started off knowing nothing about dairying – I milked in Ballyhaise College at 6am one morning in 1988, I think! When I went looking for answers the problem was that I didn't even know the questions! I went to the Teagasc conference last year and the Positive Farmers Conference, where everyone was excited with high prices. Some farmers told me to go for high yielding Holsteins, others for low cost Jerseys, some for New Zealand types and others swore by Norwegian Reds/Montbelliards/or God Knows Whats. But the people who impressed me most were the New Zealand / low cost followers who could back up everything with figures, none of the others could back up what they said to the same extent.

I'm already used to calving the sucklers to grass from 1st Feb, so this seemed to make sense for dairying too. I'm not saying everyone else is wrong, just that this system should suit my farm.

3. Attitude

Results of a "Scientific Survey" carried out among anyone I met.
8 out of 10 farmers said:

- You're mad!
- The good times are over!
- Beef will improve.
- Did you tell your wife yet!

There seems to be the idea that all dairy farmers just have to work at least 18 hours a day, maybe get by with 12 hours on Christmas Day! They can never get help anywhere, so can't take even one day off, a holiday means you're off sick.

The 5-Year Plan

- Build 26 unit milking parlour
- Build an Outwintering Pad and Lagoon, look at outwintering crops.
- Increase up to 225 Spring calving, crossbred cows
- Build tunnel under road to join both halves of the farm
- With one full time labour unit

- Replacements reared off farm
- Keep costs low, really low
- Keep gathering knowledge
- Keep it simple

What's Done So Far?

- Reduced some of the suckler stock.
- Bought 40,000 litres quota
- Bought 50 Heifers. EBI = 94
- Started 26 unit parlour
- Paddocks, roadways and water supply on half of the farm
- Planning permission got for OWP and Lagoon

Am I still happy with the decision to change over?

Milk price has dropped by 30%! Beef price has jumped by 30%! The neighbours are asking me have I abandoned my plans yet?

I still think beef is vulnerable to threats from Brazil / Argentina, Brussels / WTO and high cost inputs – meal / fertiliser / fuel. While dairying also faces some of these threats, I think low cost, grass based dairying can compete when 90% of the world's milk has to be produced indoors at high cost.

The fall in milk price has allowed me to source 50 heifers at less than budgeted for and the rise in beef price has helped me when selling suckler stock!

The farm has capacity for 220 or 230 cows at least, and maybe through a Partnership I can get to that level fairly quickly. With a good helper I can see a future that's financially secure and will give a good lifestyle.

So the plan is, by 2013, when the SFP will change, I'll have built up a dairying business to give me a decent income / lifestyle.

And **yes** I'm still happy with the decision to start dairying.