Foreword

The Open Day at Solohead coincides with the start of a new research programme on the farm. The optimum use of nitrogen in the dairy production system, and the environmental impact of nitrogen use will be assessed in association with animal productivity. The economic implications of alternative strategies of nitrogen use (including REPS) can then be more accurately assessed. In future, the milk production industry in Ireland will face a more competitive environment which is dictated by the customer's requirements for a wider range of quality products at competitive prices, produced in a clean environment and meeting stringent health and safety standards.

The research programme at Solohead forms part of the overall research programme of the Moorepark production research centre. The partnership between Teagasc and Tipperary Co-operative is making an important contribution to technology development for the dairy industry. The Solohead research site is also used as a focal point for technology transfer in the catchment area. Teagasc advisory services in association with Tipperary Co-ops have a joint programme between Teagasc and the dairy industry around the country.

Dairy farmers must use the next five years to prepare their farm business for a freer market in the longer term. Dairy enterprises will need to grow in size, be very labour efficient as well as being low cost systems of production. Production technology will continue to play an important part in improving the profitability of dairy farms while supplying milk of high quality for the food processing industry.

It is hoped that dairy farmers attending this open day will find the information of value in improving the profitability of their farm business.

Dr. Séamus Crosse,
Head, Moorepark Production Research Centre.

Solohead Experiment 2000

The objective of this experiment is to investigate systems of milk production based on low fertiliser N inputs and low stocking rates. There is evidence that nitrate concentrations in surface and ground waters are increasing. Therefore, it is likely that restrictions on fertiliser N use and stocking rates will be introduced in future. At present, there is an excess of around 300 to 350 Kg N/ha used in intensive dairy farms in Ireland. This represents the net difference between purchased N as fertiliser and concentrate feed and milk and livestock sales from the farm. On many dairy farms, milk quota size is a greater constraint on production than farm size (land area). Therefore there is scope to reduce fertiliser N input while increasing the land area available for dairying by reducing the scale of other enterprises (such as beef production) on the farm. The potentially large effect on the profitability of dairying for certain farms if stocking rate and N restrictions are introduced will be minimized if systems of high output based on lower fertiliser N and reduced stocking rates can be developed

Experimental Design

Table 1. Experimental treatments at Solohead in 2000

Treatments	Fertiliser N		Stocking rate	
	(kg/ha)	(units/acre)	(cows/ha)	(acres/cow)
1	80	64	1.75	1.4
2	225	180	1.75	1.4
3	225	180	2.40	1.0
4	350	280	2.40	1.0

There are four treatments in this experiment (Table 1).

Stocking rate and fertiliser N application rate in Treatment 1 are compatible with the requirements for REPS (Rural Environmental Protection Scheme). The swards in Treatment 1 contain substantial amounts of white clover. Treatment 4 has a stocking rate and a fertiliser N application level in line with the Moorepark blueprint for grassland management for dairying. Treatment 3 has similar stocking rate to the Moorepark blueprint, but with reduced rate of Fertiliser N.

Treatment 2 has a similar N application rate as Treatment 3 but at a lower stocking rate. This treatment is included to see whether the lower stocking rate will compensate for any reductions in grass supply and/or cow performance which might arise in Treatment 3 (compared to Treatment 4).

James Humphreys

Spring Milk Production

For the foreseeable future, the predominant system of milk production in Ireland will be compact Spring-calving, with up to 80% of the milk produced from grazed pasture. Milk quotas will remain in their present form until the year 2008. After that time quotas may be of a lesser constraint to increase milk production. Over this period there will be downward pressure on farm incomes. This will be partly as a result of price reduction (milk, calves and cull cows). Additionally the costs of silage and labour are likely to increase. It is likely that herd size will increase. Therefore, there will be more cows managed per labour unit on dairy farms.

A blueprint that will allow dairy farmers to remain competitive in these new circumstances is recommended from Moorepark. The inputs per cow include 0.5t of concentrate, 3.6t DM of grazed grass and 1.4t DM of silage. An output per cow of 6,000 litres (~ 1,300 gals.) at an average level of 3.9% fat and 3.4% protein would be achievable by most technically efficient dairy farmers. In this blueprint the reproductive programme must facilitate that 90% of the herd will calve in February/March. This is achievable with good fertility management, and selecting a cow with good fertility traits. The grazing management system must achieve high pasture output and high performance from the animals over a long grazing season. This will be achieved by allocating sufficient quantity of high quality grass on a daily basis over a long grazing season. Paddock grazing is essential, and farm layout must facilitate up to 80 cows to be managed by one labour unit. The milking system and the calf rearing system will also need to be labour efficient.

A realistic target in relation to costs and returns include a variable cost of £371/cow or 5.3p/litre (24p/gallon) with an overhead cost (excluding labour and interest on borrowed capital) of £210/cow or 3.5p/litre (16p/gallon). This amounts to a common cost of 8.8p/litre (40p/gallon) or a total cost of 12.1p/litre (55p/gallon). Receipts would include milk at 22p/litre (£1.00/gallon) and calves plus cull cows at 2.2p/litre (10p/gallon). Therefore a margin of 12.1p/litre (55p/gallon) should be achievable. On a 40,000-gallon quota, this would allow £20,000 to cover household and living expenses.

Pat Dillon, Gearóid Stakelum

Dairy Cow Fertility
Latest Research Results

The reproduction research programme at Moorepark, in collaboration with colleagues in Teagasc Athenry, U.C.D. and international institutions, has produced results of practical relevance to dairy farmers. Some of these findings are summarised here.

Calving rates are declining over the recent years

Teagasc data shows that between 1991 and 1998, overall calving rates declined by 0.5% per year. During this time, compact calving patterns were maintained by culling cows that were bred and using an increased replacement rate. A 10% difference in replacement rate equates to a 5p difference in margin/gallon in a milk quota environment.

Pregnancy rates are low on dairy farms

A recent survey of 6,000 cows across 73 herds showed that the average first service pregnancy rate was 48%. This, combined with an average submission rate of 70%, has resulted in a calving to conception interval of 89 days and 14% of cows not-in-calf at the end of a 15-week breeding season. This performance is not compatible with compact calving.

Embryonic mortality is a common problem

Detailed sequential examinations of 1,000 cows showed that 7% of cows scanned in-calf at approximately 30 days will suffer embryonic mortality over the subsequent two months. Possible causes include infectious agents, nutrient imbalances and genetic wastage.

Genetic merit affects oocyte quality

High genetic merit cows of imported origin yielded oocytes of lower quality, resulting in fewer blastocysts, than medium genetic merit cows. Poor oocyte quality, which was significantly affected by body condition score, is likely to contribute to reduced fertility in high genetic merit cows.

Neosporosis can cause severe foetal losses

Investigations in herds with high levels of late foetal losses associated with abortions and mummified foetuses has revealed the presence of a new parasite, Neospora caninum. Diagnosis is based on blood samples and examination of the foetus. Control involves improving herd biosecurity.

Milk testing for herd infections is now available

Bulk tank sampling for infectious agents which may cause reduced fertility (Leptospira hardjo, BVD virus) can now be carried out to provide herd-level surveillance of these infections. A recent Teagasc BMT survey of 57 herds showed that 70% of herds had recent exposure to BVD virus. A nation-wide Leptospira BMT survey is currently underway.

John F. Mee

Moorepark Farm Fertility Study Initial Results

In recent years Irish dairy farmers have expressed concern about the reproductive performance in their herds. There is considerable evidence in the literature from other countries that selection for milk production may lead to reduced reproductive performance. Two long-term experiments conducted at Moorepark have shown much reduced reproductive performance with high genetic merit Holstein-Friesan dairy cows. A large farm study involving a total of 73 herds with almost 6,400 cows was initiated in Moorepark in 1999. The objective of the study was to relate genetic merit for milk production, feeding management and health and reproductive management to the reproductive performance being achieved on commercial spring-calving dairy herds. The average milk production per cow achieved on the farms was 1,240 gal with a range of 1,054 to 1,569. Average pre-calving condition score was 3.37, varying from 3.00 to 3.62 on an individual herd basis. The average pre-calving live-weight was 620kg with a range of 565 to 696. The loss in condition score and live weight pre-calving to 30 days into lactation was 0.42 and 82kg respectively.

The average herd reproductive performance for all the fertility indices measured were outside the targets established for seasonal spring-calving herds. The average submission rate in the 1st 3 weeks, pregnancy rate to 1st service, calving to conception interval and infertile rate were 70%, 48%, 89 days and 14% respectively, compared to the targets of >80%, 60%, 85 days and <10%. The top 25% of farms ranked on ‘pregnancy rate to 1st service’ were close to the targets for seasonal spring calving herds at 73%, 59%, 88 days and 11%. There was large variation between farms for all the fertility indices measured e.g. submission rate in the 1st 3 weeks (33-96%), pregnancy rate to 1st service (26-73%), calving to conception interval (77-115 days) and infertile rate (0-30%).

Large differences were observed between daughter groups of different sires for milk production, condition score and pregnancy rate. Milk production (kg/cow/day), condition score and overall pregnancy rate ranged from 20.5 to 25.6, 2.77 to 2.99 and 0.83 to 0.95 respectively for daughters groups of different sires. Preliminary genetic analysis indicates that the heritibility (h^2) estimates obtained in the study are similar to those published previously for milk production traits (0.24-0.57), live weight (0.38-0.45), condition score (0.36-0.41) and pregnancy rate (0.05). Genetic correlations indicate that both milk yield and live weight are negatively correlated with pregnancy rate (-0.47 and -0.40). However condition score is positively (+0.44) correlated with pregnancy rate. Therefore, preliminary results suggest that both live weight and condition score may be important traits in indirect selection for improved reproductive performance.

Frank Buckley, Pat Dillon, Ross Evans, Ger Ryan

Grazing Management Where to Make the Improvements

Grazing management should aim to provide a supply of nutritious herbage to the cow over the grazing season. This should be provided at low cost, avoiding inefficient utilisation of herbage and by maintaining the productive capacity of the sward. The needs of both the animal and the sward need to be considered. Severe adverse effects on either should be avoided.

To achieve high performance from grazing dairy cows at pasture, the available grass must be rationed in a systemic way and high levels of daily herbage intake must be achieved. The level of grazing intensity must allow high intakes and maintain quality grass in the regrowths. Information on the supply and allowance of grass and the level of grazing intensity are required in order to put good grazing management into practice. There are four key elements in grazing management:

Farm cover refers to the total supply of grass dry matter (kg DM) per hectare above 4cm on the cow grazing area. There are four critical farm cover targets to be achieved during the grazing season:

(a) 400-450kg DM/ha at closing in the autumn (around December 1st)
(b) 600kg DM/ha at turnout in spring (around March 1st)
(c) 950-1000kg DM/ha during the main grazing season (end April-July)
(d) 1200-1250kg DM/ha in mid September

Daily herbage allowance is the amount of grass DM>4cm made available to the herd over a 24-hour grazing period. Optimum daily herbage allowance above 4cm is 20kg DM for dairy cows with a RBI (00) of 100. Cows with higher milk yield potential require larger herbage allowances (up to 24kg DM).

Post grazing sward height refers to the undisturbed height of sward in a paddock immediately after grazing. Optimum post grazing height during the main grazing season is 6cm. This can be allowed to increase to 7cm in the latter half of the season. Grazing to this height is essential for high cow performance and achieves a balance between feeding the animal adequately and maintaining sward quality during the grazing season. Pasture topping to 6cm can be used where pastures are undergrazed (i.e. above 7cm) to maintain pasture quality.

Pasture quality refers principally to the digestibility of the herbage and is highly related to the grass leaf content. Pasture digestibility changes are associated with both chemical and structural changes in the sward as well as herbage mass and allowance. The digestibility of pasture changes throughout the season. Generally, the OMD in late March/early April is in the range of 84-86% and is lowest in July and August at 80%. Swards of lower digestibility support lower levels of intake and milk production regardless of the level of grazing intensity at the time. The main causes of poor pasture quality are under-grazing (i.e. a PGSSH above 8cm), too long a re-growth interval (greater than 21 days in the April to June period), and poor botanical composition.

Michael O'Donovan, Gearóid Stakelum

Making Minimum Cultivation Work

Perennial ryegrass yields about 25% more than weed-grasses. Most of our grasslands have a low level of perennial ryegrass. Approximately 45% of total reseeding is carried out between mid August and mid September. Reseeding at this time is reliable, but timing of sowing is important. Early autumn sowing will result in approximately 74% seedling emergence, compared with 55% from later sowing. Both yield and tiller number will also be significantly lower in the following March with the later sown crop.

Minimal cultivation allows perennial ryegrass to be introduced into swards without ploughing. There is less work involved. There are fewer stones bought to the surface. There is less soil disturbance and therefore better support for machinery and animals at the early stages. Young seedlings can make use of the fertile soil at ground level.

Procedure:

- Spray with a glyphosate-based herbicide when the old vegetation is at least 6-8cm high.
  Graze tightly, or cut off the vegetation 5-7 days later.
  Alternatively, close the area proposed for re-seeding for silage, and spray 7-10 days before harvesting.
- Apply ground limestone and fertiliser as recommended by a soil test. Where the minimal till system is used, a minimum of 3.5t lime/ha should be applied prior to cultivation.
- Cultivate the top 6-8cm of the soil with a suitable cultivator (e.g. power harrow or spike rotovator) to a fine tilt. Alternatively one-pass machines are available to cultivate and sow.
- Roll the seedbed prior to sowing to prevent seed being buried too deep into the cultivated ground.
- Broadcast the grass-seed mixture at the rate of 31-34 kg/ha, and roll again to consolidate the seedbed.
- Have the re-seeding completed by early September.
- Control any problem weeds as soon as possible.
- Graze down to 6cm with young stock during early establishment.
- Grazing is better than cutting in the year following sowing.

Under good management, silage areas should remain productive for up to 6 years. Grazing swards will last much longer. However if management is poor, swards can deteriorate rapidly. The guideline should be to re-seed where necessary rather than by age. Avoid late and heavy cuts of silage and cutting silage too bare i.e. to 4cm. In grazing areas, lax grazing reduces tillering of the good grasses and allows weed grass to creep into swards. Alternating grazing and silage cutting areas extends the productive life of the swards.

Frank Kelly

Which Drainage System?

Our knowledge of the hydrological characteristics of Irish soils has advanced to the stage where, with proper site investigation and application of the known principles of water flow in soils, we are able to design a satisfactory drainage system for most cases. Indeed when most lowland soils with a high watertable are properly drained they should be indistinguishable from naturally well-drained soils.

The single most important physical characteristic of any soil for drainage purposes is its permeability to water. This is known as its *hydraulic conductivity*. This is a measure of how easily water can flow through the soil. A soil with a high proportion of coarse particles such as sand or gravel will have a high proportion of large pores between the particles and therefore a high hydraulic conductivity. Similarly, a soil with a high proportion of very fine particles such as clay will have a high proportion of fine pores and thus a very low hydraulic conductivity. The difference in permeability between different soils or soil layers can be enormous. Gravel layers can have values hundreds of millions of times those of heavy clays. Soils are naturally well drained only where they have sufficient hydraulic conductivity to take the heaviest rains *and* where underground conditions are such that water can flow latterly and freely through gravel layers or fissured rock to streams or other outlets.

A successful field drainage design for a wet but permeable soil (i.e. a soil with a hydraulic conductivity above a certain threshold) is that which lowers the water-table from the root zone for all but the most extreme rainfalls. This is achieved by means of drains placed at optimum depth and spacing. Drains placed in or near the most permeable layer in the soil profile are normally much more effective in achieving this. Very clayey soils with very low hydraulic conductivity and no obvious permeable layers can be more difficult to drain. These soils require the hydraulic conductivity to be increased to a minimal value, by ripping or loosening, and drains placed at close spacing. Both effects are achieved by installing mole drains. Naked moles are used if the clayey soil forms stable channels but gravel filled moles are usually necessary for most clayey soils where mole drains are indicated.

The first step in proper drainage design is the identification of the particular drainage problem. The extent and depth of layers of high permeability can be observed from deep test pits. The soils on the farm at Solohead were laid down when the ice after the last glaciation finally melted. It has layers of glacial lake silts and stony till with some loose layers of gravel and sands. In wet areas there latter permeable layers are common at 1.5 to 2.1m. (5ft. - 7ft.) Drains are installed at approx. 1.8m. (6ft.) depth with good effect. A spacing of 25m. was used.

Most of the productive land in the country that was drained in the past and that still has drainage problems will probably not respond to conventional drainage where the depth of drains is under 1m. or where the spacing is several metres apart. These drainage problems need to be thoroughly investigated and in the majority of cases either deep drains or mole drains will be needed. Modern self-propelled trenching machines have the potential to reduce the cost of deep drains by excavating the drain, laying the pipe and back-filling with aggregate in one operation.

Tim Gleeson

Earth Bank Storage Tanks

On many farms slurry storage is inadequate particularly for long winters and late wet springs. Well constructed earth bank tanks can provide essential storage and can be connected to existing cattle housing by shallow channels on suitable sites. Earth banked storage tanks have the potential to make all farmyards effluent-free as far as surface waters is concerned. It is essential that the banks and floor be constructed only of tough plastic soil and that all loose, stony, gravely or permeable layers are dug out and replaced with dense clayey material. Banks and floors must be compacted with dozers or heavy tracked diggers. Top soil or other organic material, which must be removed at the start, may be used only on the outside of the banks and for final topping-off cover. Allowance has to be made for winter rain in tank capacity. Nevertheless the cost of earth banked tanks is less than 10% of the cost of equivalent concrete structures.

Tim Gleeson

Irrigation of Dirty Water

Well-designed drainage can eliminate the occurrence of surface run-off from rain on wet soils. Where dirty yard and wash water are irrigated from a single gun infrequently moved, bio-mat seals could develop even on well-drained soils resulting in run-off of polluting waters.

Practical guidelines for spray irrigation of dirty water include a maximum of 5mm. irrigation/day (5gal./yd.^{2} approx.)/day. This should be done for no more than 4-5 days in a row (giving a max. irrigation of 25mm) and then a new site should be chosen. Sites may be recycled at 3-4 week intervals but the maximum annual irrigation should be kept under 250mm, i.e. no more than 10 times with 25mm irrigation at each session to preserve good soil structure and avoid bio-mat-seals developing.

Tim Gleeson

Nutrient Management Planning

One of the challenges facing long-term profitable farming is the protection of the environment, especially water quality. Fortunately, this challenge can be largely overcome with good Nutrient Management Planning (NMP). This involves the proper use of fertiliser and slurry so as to give optimum yields at low costs with minimum risks to the environment. Nutrient management also deals with the proper storage and application of slurry, fertilisers and other products.

Risks

From the point of view of damaging the environment, phosphorus and nitrogen are the greatest risks is used incorrectly. The application of slurry or N fertilisers at times of the year when there is no growth is very risky. This is particularly so when applied before rain and on sloping or frosted ground. Adequate slurry storage is essential. When animals are out-wintered on 'sacrifice' paddocks, large quantities of N are deposited on bare ground. Most of this is either leached to ground-water or run-off to surface-water.

Water Quality

Water quality throughout most of the world is deteriorating. The quality of Irish water sources is much better than most other European countries. For example, only about 5% of rivers in Denmark and Holland are classified as good, whereas 70% of Irish rivers are classified as good. This is a great natural resource which must be protected. However, a disturbing fact is that Irish water quality has deteriorated significantly in the last decade. The latest reports from County Councils and the Environmental Protection Agency show that many of our public drinking water sources are now very close to the E.U. maximum limit for nitrate levels. Phosphate levels are also at a serious level in some water sources. This, of course, is not all due to agriculture.

The E.U. Nitrate directive states "that stringent legally binding measures be taken'' in respect of farm practices so as to reduce nitrate losses to water where there is a risk of pollution''. Action must be taken by farmers not only to prevent any further deterioration of water from agriculture but to improve water quality. Excessive Phosphorus and Nitrogen usage is prevalent on many farms. This is due largely to the fact that 3 out of 4 farmers don't soil-test or seek specific fertiliser recommendations from Teagasc.

Action

Fortunately, actions taken to improve water quality in the form of NMP will normally save farmers significant amounts of money on fertilisers without reducing output. Surveys show that many farmers can save over £1,000 on fertiliser costs. In the long-term, NMP will improve quality and the competitiveness of Irish dairy products.

Joe Sheehy

Silage Machinery and Compaction

The weight of all farm machinery has increased significantly over the years. This has been particularly evident with silage harvesting equipment as contractors have striven to become more efficient, with higher output equipment and particularly with high capacity trailers (Table 2). This increased weight of harvesting equipment can cause problems.

Table 2:	Machine weights	
	120 HP tractor (ballasted)	5.5 – 6.0t
	S.P. forager	10.0 – 13.0t
	Large silage trailer	15.0t+

On wet land, or indeed on dry land in wet seasons, problems such as poor trafficability, leading to surface damage, are easily visible. Our research in Kilmaley originally targeted this problem, resulting in the modification of equipment with low ground-pressure tyres. This work was highly successful and has allowed silage to be harvested without damage in Kilmaley even in the wettest years (1985, 1986 and 1998).

More recent research has focused on the less visible problem of soil structure damage or compaction. A trial comparing conventional, low ground-pressure and zero traffic systems was carried out over a 3-year period at Kilmaley and Oak Park (dry site). After a couple of years of traffic, substantial differences in yield became evident (Fig. 1). By the end of the trial, plots that were harvested with LGP equipment were yielding in excess of 15% more grass than those that received conventional traffic at Kilmaley. At the very dry Oak Park site there was an 8% benefit in yield to the LGP equipment. These yield differences were achieved in relatively dry years where no surface damage was caused by any of the treatments. The value of this yield benefit is substantial. At a silage production cost of £70/t DM, the extra LGP yield would be worth £63/ha at Kilmaley and £34/ha at Oak Park for first-cut alone.

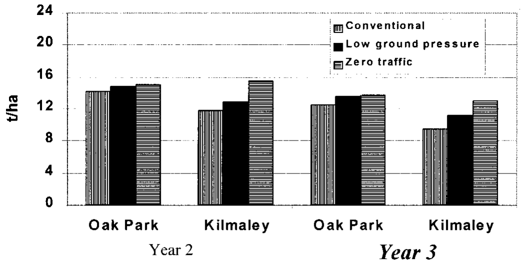

Figure 1: Forage dry matter yields (t/ha)

How can this benefit be achieved on farms? Silage is almost universally harvested by contractor. The investment that is required by a contractor to substantially reduce ground pressure would be considerable. A self-propelled outfit could require an investment of more than £30,000 in wheels and tyres. While this is a significant cost, if the outfit harvests more than 1,000 ha. in the season, the annual charge could be as low as £7-10/ha. This would only take about a 2% increase in yield to justify the investment. Contractors cannot be expected to invest in LGP equipment without getting paid for it. All of a contractor's customers must be prepared to pay to avail of this substantial return.

Dermot Forristal, Tony Fortune

Labour Use On Dairy Farms

'Setting benchmarks for the future'

Labour requirements and working conditions play a central rôle in modern dairy farms. Labour contributes greatly to costs. It is becoming more expensive and its deployment is limited. Farmers now have to cope with various external factors which influence their farming, such as rapid changes in milk production technology, a booming industrial sector, regulations relating to environment, product quality and health and safety issues.

It is now 15 years since a comprehensive study of labour on dairy farms was carried out. This period also coincides with quota constraints on milk production, a rapid change in technological development on farms, changes in the standards relating to milk quality and the environment and a rapid change in the economy, generally of which agriculture forms a declining part thereof.

There is a need for a comprehensive and accurate survey of human resource factors in Irish dairy farming and the efficiency with which they are used. Since human resources for the dairy enterprise are likely to assume much more importance in future, research is essential, so as to give guidelines on the future development of the dairy industry. Success therein will improve labour productivity and reduce labour costs on dairy farms. It will also highlight the major obstacles with regard to labour supply.

A detailed examination of labour-use is essential if we are to develop new strategies for optioning and utilising labour in the future. Teagasc, Moorepark, in association with UCD and commercial farmers, are embarking on a new major study on labour use and cost on dairy farms.

Almost 150 farms are being analysed during the course of the study. This will incorporate a detailed analysis of farm practices, as well as an assessment of farm layout and facilities. Moorepark teams visit on a regular basis and assess the farming system and practices that are in place. Data is also being studied with regard to the major farm tasks and their labour requirements, as well as the existing labour structure on the farm. In this survey, close scrutiny will be placed on the farmers' day and the amount and type of labour that is required to run the farm. Analysis of the data will identify the main sources of labour demand on the farm, and how that is related to facilities and the farm lay-out.

Such information will allow Moorepark researchers, from various fields of expertise such as the milking process, nutrition, hygiene etc. to visit the participant farms and propose practical solutions. Implementing such solutions will form 'Year 2' of the study. A study of the new modified farming system will be repeated at this stage.

Ultimately benchmarks for various farm practices and farming systems will be ascertained. This will enable farmers to calculate levels of labour efficiency inside their own farm gate. Such benchmarks will allow for the assessment of the competitiveness and performance of farming operations. This information will give farmers cold, hard relevant data, which they could directly relate back to their farms.

They could then look at benchmarks on farms with very similar parameters and compare various performance indicators, such as cows per labour unit.

The population from which the farms are drawn consists of mostly Spring-calving Summer milk producers from Discussion Groups with close links to the Moorepark Research and Advisory Centres. Their Quota size is in excess of 50,000 gallons of milk.

Kevin O'Donovan

Natural Irish Milk

Dairy production systems worldwide could be classified into three categories, i.e. indoor production (intensive), organic production and a spectrum of systems varying between both extremes. The influencing factors of climate and economics determine the category of production chosen in any given location. Within the category of systems ranging from indoor to organic, research has shown the Moorepark spring milk production system to be the optimum system of production in the Irish context. Thus, from an Irish perspective this "Moorepark blueprint'' should be taken as the mainstream system of production. When operated efficiently this system has an output of 6,000 litres of milk per cow with an average fat content of 3.9g/100g. and a protein content of 3.4g/100g. This level of performance is achievable at a stocking rate of 2.5 cows/ha., a nitrogen input of 325 kg N/ha and a mean calving date in late February/early March. The inputs per cow include 500-600 kg. of concentrates, 3.6t (DM) of grazed grass and 1.4t (DM) of silage. Intensive systems are operated in most countries in Europe and in the US. These systems require cows to be housed for the greater part of the year in Europe and restricted full-time in corrals in parts of the US. Cow intakes comprises limited grazing, zero grazing and concentrates. On the other hand, organic systems do not allow the prophylactic use of antibiotics, the use of N fertiliser, chemicals or pesticides. Stocking rates of 1.3-1.4 cows/ha are recommended together with loose housing and straw bedding.

Recently there has been increasing support, interest and demand for organic food across Europe. Marketing surveys suggest that there is huge scope for expansion in this sector. This is understandable; the consumer is making a comparison between the produce of organic and intensive systems and has a fear or at least a large question about intensive farming methods. However, how different is our mainstream system of production in Ireland (Moorepark system) from an organic system? This issue may be addressed by considering animal welfare, the environment and milk quality. Within the Moorepark system over 80% of milk is produced from grazed grass between May and September. Milk production from grazed grass is the most natural from the cow's point of view. She is operating in the environment she evolved in and is consuming a high quality fibrous foodstuff, which eliminates the risk of metabolic diseases associated with high grain feeding in other systems of milk production. The concern of consumers, that milk is being produced by cows consuming genetically modified food is removed, as the only component of the diet is pasture. In this Moorepark system, the cow can roam freely over pastureland with the ability to select the most nutritious portions of grass, a selectivity that is often restricted in indoor systems of feeding. The good health of cows on this system is evident by their level of food consumption, which can reach 25 kg DM/day, and their health status as indicated by low somatic cell levels (SCC) in milk (<200,000/ml.), the virtual absence of foot problems (<2% of the herd) and good reproductive performance. The Moorepark system of milk production also eliminates the need for the storage of the daily production of manure because the cow returns it to the pasture herself! Thus, the problem of spreading large quantities of manure to the soil at different times of the year are eliminated. This is a system of natural re-cycling. Milk produced from pasture (as in the Moorepark system) is also a source of some very positive components from a human health point of view, e.g. monounsaturated fatty acids which lower cholesterol, calcium which is protective against osteoporosis and conjugated linoleic acid which is protective against certain types of cancer. Milk producers within this system have to possess a licence for milk production. This licence ensures compatibility with good animal health and welfare and with quality and safety of the final produce. In general, such milk producers respect the use of antibiotics, N fertiliser, chemicals and pesticides. It is in their own interest to reduce costs of surplus inputs, while maintaining the cow in optimum condition to increase output. In addition, this milk is monitored and controlled to strict standards of SCC, total bacterial count (TBC) and residue levels (antibiotic and chemical).

An interesting point about organics in Europe is that they are trying to and would imitate our system if they could, e.g. increasing milk production from grass and leaving cows outdoors for longer periods. One rule of Danish organic farming is that cows should be outdoors for a minimum of 150 days per year; cows are outdoors – 250 days per year with the Moorepark system.

We need to capitalise on our natural advantages. We already have a clean, green mainstream agricultural system in Ireland, but if we are to reap the benefits, it must be marketed in a more sophisticated, documented and audited fashion than merely showing nice pictures of green hills in advertisements. The adoption of a unified, branded system for mainstream milk production in Ireland, and a brand name for the products should ensure a premium for both producers and Ireland. In conclusion, the greatest demand of consumers is that the system, which produces the food that they buy, is safe and environmentally protective; that demand is satisfied within our mainstream milk production system in Ireland.

Bernie O'Brien, W. J. Meaney

Teagasc/Tipperary Co-operative Protein Plus Programme

In 1998 an enhanced technology transfer programme (called *Protein Plus)* was agreed between Tipperary Co-Op, Thurles Co-Op and Teagasc. The Protein-Plus programme was launched in February 1999. There are 11 discussion groups with about 280 suppliers, in both North and South Tipperary. These discussion groups meet on a monthly basis and are co-facilitated by Teagasc Personnel from the local and regional offices. An important element in the programme is the six *Monitor Farms*. These are used to extend the research of Moorepark/Solohead to farms in the area. These *Monitor Farms* are visited six or seven times during the grass growing season and advice particular to each farm is given at every visit by Teagasc staff.

All suppliers to both co-ops are invited to the Solohead Research Farm three times per year to hear from the Researchers and farm staff. The final component of the Programme is the farm visit during which topics discussed at recent Discussion Group Meetings can be further debated and tailored to each individual farmer's circumstances.

The main objectives of the Protein Plus Joint Programme are an improvement in milk protein % and the reduction in the costs of production. With the six *Monitor Farms* selected and operational $1^1/_2$ years at this stage, it is possible now to report progress. The main progress made to date on the *Monitor Farms* can be described under the following five headings:

- Milk protein content.
- Identification of costs of production.
- Grassland management.
- Quota management.
- Breeding policy.

Milk protein content – 1999 was the first full year of the Joint Programme and at year end the average protein % for the Monitor Farmers was 3.22%. In the period to the end of April 2000, the cumulative protein is 3.21% (compared to 3.06% for the same period in 1999). The increase in protein % in the first four months of 2000 (combined with a smaller increase in butterfat%) has meant that the *Monitor Farmers* have increased their average milk price (Jan. - April) by 1.5 pence per gallon over the same period last year.

Identification of costs of production – all *Monitor Farmers* completed Dairy Profit Monitor for the 1999 production year. The main findings of this analysis were:

- Dairy Output of 100.2 ppg.
- Common Costs of 42.9 ppg.
- Common Profit of 57.3 ppg.
- Meal cost of 10.8 ppg.

All of the *Monitor Farmers* have been advised on the best course of action to take to reduce the costs of production on their farms. Discussion Group members were also encouraged to complete Dairy Profit Monitor and all discussions at the regular Group meetings have a cost focus.

Grassland Management – on average cows were out by day on the *Monitor Farms* on 28th February 2000; this is 11 days earlier than 1999. As well as cows being out earlier there was also a better supply of grass in early March. This resulted from better grassland management on these farms in autumn 1999. All of the *Monitor Farms* commenced a reseeding programme during 1999 – the full benefits of this are now being obtained. Finally all *Monitor Farms* were comprehensively soil sampled and the appropriate fertiliser recommendations were made to each farmer.

Quota Management – close attention was paid to this area during 1999 and early 2000. A Teagasc computer programme was used to predict the milk supply pattern on each farm and this was compared with actual deliveries on a regular basis. In addition all *Monitor Farmers* were encouraged to purchase quota under the Milk Quota Restructuring Scheme. All farmers were successful in their applications.

Breeding Policy – All *Monitor Farmers* selected bulls for both the 1999 and 2000 Breeding Seasons from the Teagasc Protein Improvement Bull Lists.

In conclusion, the *Monitor Farmers* are making improvements as a result of the advice they are receiving from their local Teagasc Advisors and Teagasc Regional Staff. Discussion Group members are being presented with the same advise and should take very opportunity to take part in the debates and discussions, which take place at every Group meeting. Farmers should also visit the *Monitor Farm* in their area when the opportunity arises and see how these farmers have made the improvements described above. Finally for farmers who are not Discussion Group members, you should contact your local Teagasc Advisors to find out more about the Groups in your area.

Paddy Murphy, Tom O'Dwyer