

Provision of a scientific knowledge transfer-base for 21st century dairy farming in the UK

***A document for progress prepared by the Dairy Science Forum
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Scope

This paper draws Government and industry's attention to current gaps in the UK's research and scientific knowledge transfer bases and highlights areas requiring action in order to improve the sustainability of the UK dairy farming industry.

Executive Summary

- Global food production will be required to double by 2030 to meet the demands of increasingly affluent populations on course to grow from 6.5 billion to nine billion by 2050. Demand for milk and dairy products, which are nutritionally valuable parts of the human diet, is expected to grow accordingly.
- There is likely to be both an increasing need and an increasing business opportunity for dairying in Northern Europe, as climate change is predicted to impact more severely on food production elsewhere.
- The UK dairy industry has been allowed to diminish dramatically in scale over the last decade under conventional market pressures. Continual price cuts over the last 10 years have led the number of GB producers to half – approximately 16,700 have quit the industry and production has fallen by 817m litres and the sector is heading for a one billion litre shortfall in the 2008/09 quota year. An upturn in milk prices in the last 12 months provided some respite, however input costs have rocketed and the majority of producers are now barely breaking even. A minimum additional 3ppl is required in the short term for a sustainable sector, however, without a clear national strategy to ensure its medium-term future, it remains very fragile.
- In the medium to long term, dairy production in the UK will be important to help ensure local food supply security and to contribute to a growing global demand for dairy products.
- At present, and in the short term future, the UK dairy industry sits between a deteriorating past, and a promising future
- Over the last decade (or more) of decline, there has been a parallel loss of expertise, support skills, research investment and research infrastructure. For example, DairyCo (formerly MDC) R&D funding has fallen by 80% in the last five years; Defra R&D funding for animal science has fallen by 20% in the last 10 years; overall R&D funding for animal science is well short of the EU target for overall research funding of approximately 3% of GDP by 2010.

- Veterinary and other provision to ensure good health and welfare has weakened. Veterinary surgeons appear on the Migration Advisory Authority's official 'recommended shortage occupation list' presented to Government Sep 08.
- Research capacity in basic and applied sciences germane to genetics, nutrition and management techniques for the delivery of effective and innovative production systems needs to be maintained (and in some areas rebuilt).
- Future production systems will call for ever more intelligent approaches to the simultaneous achievement of quality systems that minimise environmental burdens, sustain high standards of health and welfare and deliver nutritionally valuable products into well organised food supply chains.
- Equipping farmers, their employees, their advisors and their supply industries with relevant skills to do this is a priority.

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Introduction

This paper sets out the collective views of the members of the Dairy Science Forum on some of the challenges facing the UK dairy industry. The Dairy Science Forum is a long-established, *ad hoc* group of individuals, each well recognised and specialised in a particular segment of the industry. Membership is limited and by invitation to ensure representation at an appropriate level across the breadth of the industry. The objectives of the Forum include:

- understanding and disseminating the contribution of research, development and extension to dairy science and practice,
- defining future areas of activity that may enhance efficient productivity and improve the well-being of the cow to fortify a viable dairy industry.

Production of this document is the result of the increasing concern by the membership over the future profitability and sustainability of the dairy industry. The lack of a national strategic forward plan for the UK dairy industry has, in the view of the Forum, placed the industry in a weak and vulnerable position. It comes at a time when there is increasing concern about the national and international food supply as well as about the potential impact of world food demand on environmental resources. The devolved regions of the UK have produced vision statements in various forms and the Forum believes there should be a UK-wide forward strategy.

The Forum firmly believes that there are excellent opportunities for a profitable and sustainable future, but that achievement is dependent on positive action both by the industry and Government. The document highlights areas requiring consideration set in a framework of the current and likely future situation. It also intends to be a catalyst to develop strategic studies for the benefit of the whole dairy industry by highlighting the main research issues that need to be addressed in both the near future and long term.

The Challenge

The UK needs a competitive and profitable dairy farming industry, not just for economic reasons, but also environmentally and socially. Furthermore, real concerns over the security of food supply and potential food sources cannot be ignored as demonstrated by the recent seismic shifts in soft commodity markets.

Food scarcities in various highly populated areas of the world are likely to grow. This presents European and particularly UK producers with the challenge to produce enough food in a sustainable manner to meet these needs. Energy, environment and food are clearly interlinked. Farmers will play a key role in creating the required balance for markets and human needs, both now and in the future.

There is likely to be both an increasing need and an increasing business opportunity for dairying in Northern Europe, as climate change is predicted to impact more severely on food production elsewhere. The growing global tensions over use of land for producing human food versus livestock feed, may further benefit dairy industries like that in the UK which can exploit land not well suited to cropping.

A background framework

Production resource

The steady reduction in the number of production units in the UK over the last half-century is well documented but it has accelerated over the last five years. It is inescapable that the economic and political circumstances prevailing in recent years have resulted in many efficient, business-minded farmers leaving the industry.

For most of the last decade, the UK has been at the bottom of the EU milk price league table, thus management and forward planning of farm businesses has proved difficult in the face of rising costs, volatility in the market and a high regulatory burden. Whilst there has been some improvement in farm gate prices in recent years, long term planning remains difficult due to market volatility and the complexity of price forecasting.

Dairy UK's 'The White Paper' published in July 2007 reported on the state of the UK Dairy Industry. It recognised that "many farmers have encountered acute business difficulties and the challenges they have faced cannot be underestimated". The joint NFU and RABDF publication, 'British Milk – What Price 2007?' reported that the costs of milk production between 2002/03 and 2006/07 increased by 16.43%. The figures did not account for exceptional costs incurred and did not provide scope for investment.

Re-structuring of the production side of the industry is bringing benefits from scale of enterprise, improved management and further efficiencies. The dramatic reduction in the number of production units and the general uncertainty also has implications for the supply and service industries. Since dairying has been one of the mainstays of agricultural veterinary practice (and other supply businesses), many areas of the country now have fewer farm animal vets and in some cases, there is less than satisfactory veterinary cover. This has clear welfare and disease surveillance implications..

Government resource

To review the background to this document, the role of Government has to be considered. Historically, the public purse has played a substantial role in encouraging the development of a viable dairy industry including investment in research and development with grant-aid for structural farm development and support by advisory services. UK Government is encouraged to review its current apparently negative position on agriculture and realise its key position in providing secure food for the nation's future. Concern has also been expressed over the apparent lack of understanding in UK Government of the rural economy.

The position is evolving. Whilst not wishing to enter the "level playing field argument", the Forum urges Government to consider that issues such as investment in environmental improvements (e.g. slurry and waste management) could be considered as an element of rural development and thus qualify for financial support under Pillar 2. The Forum is aware that other EU states take a different approach (from the UK) to grant-aid, which provides others with competitive advantage.

The dairy industry as a whole has "signed up" to the UK Animal Health and Welfare Strategy but it would welcome further consultation and opportunities to contribute to issues of such significance and importance.

The issue of food security has been raised above when considering the challenges facing the industry. The Forum recognises the need for “a flexible, skilled and market-orientated agriculture, able to flex production in extreme circumstances” as concluded by the Sustainable Farming and Food Strategy (SFFS) produced in England; this point of principle applies to the whole of the UK. However, it is a matter of concern to the Forum, the membership of which is drawn from across the UK, that the devolved regions adopt different positions in relation to food security matters. There should surely be one position for an island of this size.

The UK’s ballooning food trade deficit, equivalent to 1% of GNP T is a neglected area of food security. One of the big questions relating to sustainable growth and security is which sectors of food production can respond to the need for increasing output? The dairy sector is clearly one that could readily grow given the appropriate incentives.

R and D resource

There is good evidence that investment in R&D delivers very substantial benefits to producers, animals and consumers. For instance, the British Society of Animal Science recently highlighted the impact of scientific research at the University of Nottingham in tackling poor fertility of dairy cattle, which is estimated to cost the UK dairy industry £300m per annum. Furthermore, dairy farming accounts for 20% of the UK methane inventory and 42% of agricultural emissions. The trend for increased milk yield and fewer dairy cows is predicted to reduce national emissions by 17% over the next 20 years. A reduction of 32% would be achieved, however, if fertility could be restored to levels achieved in the 1970s. Initial studies have demonstrated that this can be achieved, even in cows yielding 10,000 litres of milk, and significant improvements are being seen also on commercial farms. Similarly, the use of nationally-available measures of genetic merit of dairy cattle in the UK over the last 20 years has been worth over £400 million at ‘farm gate’ prices, and the benefits continue to rise. An increasing share of these benefits is a result of the expansion of £PLI to include measures of health and fertility, based on research at SAC, Roslin Institute and the University of Edinburgh, with benefits to cows as well as producers (around £147 million; Amer et al, 2008).

There is no doubt that the UK capability to deliver scientific input to agriculture, especially dairy research and development, has fallen dramatically in the last 20 years. Two national dairy research institutes have been closed in recent times, as have several dairy herds on experimental husbandry farms. Facilities for research with dairy cows are now concentrated at CEDAR, SAC, Nottingham University and a few other university and college farms.

The encouragement of so-called “high quality” publications, as a determinant of output, in Universities and Research Institutes has resulted in a general drift away from farm-relevant research. Universities now do much less research that directly impacts on agriculture. Many research funders have changed their agendas leaving all applied research establishments increasingly fragile.. Furthermore the lack of investment in infrastructure and staffing in some establishments has serious consequences (as illustrated by recent problems at Pirbright).

Research is a continuum; passing from *fundamental* to *strategic* to *applied* to *transfer*. The Forum's major concern is that the model is broken. There are serious weaknesses in the ways by which the available funding is allocated resulting in an uncoordinated approach. The need for the current funding bodies to review their approaches in order to extract better value for money, we believe, is self evident.

Appendix 1 provides a review of R and D support for the dairy sector. Appendix 2 identifies some examples of R and D requirements in key areas which would contribute to the future sustainability of the industry.

Skill resource

The dairy industry relies on a continuing supply of a wide range of people and skills. For the industry to be profitable and sustainable, the future supply of appropriate, adequately qualified and trained people must be assured. Whilst a full assessment of all requirements would be worthy of analysis, the Forum has identified three key groups which are vital to the future well being of the production industry:-

a) Scientists

Whilst the training capacity may be adequate to meet general needs, experience of the Forum members involved in research indicates a growing shortage of skilled and motivated young scientists in the UK who want to address applied issues in the dairy sector. In recent years, a large gap has developed between basic research (which is reasonably well supported) and application. (see graph)

The number of science graduates is increasing but financial incentives are greater in other areas of society than in dairy industry research. Currently, there is a strong reliance on overseas PhD students who eventually return to their country of origin. Research groups and establishments themselves should encourage training of their own postgraduate/postdocs and it is up to scientific leaders to value and excite postgraduates into the opportunities provided by the dairy industry.

There is a particular shortage of research scientists with both strong disciplinary skills and an enthusiasm for integrated systems thinking and research. This is essential to address the pressing challenges of feeding the growing global population in an environmentally and socially acceptable way.

b) Farmers and their employees

The Forum shares the concern of many others in the industry over the current and future shortage of skilled labour. Historically, increasing mechanisation replaced labour inputs but the industry now needs to consider alternatives such as much greater automation to replace the labour shortages.

However, the issues relating to human resource to support agriculture are still very important. At farm level, there is a need for a framework for developing the grass-roots skill base and for co-ordinated training programmes. In particular, the current shortage of farmers and farm employees with well-developed farm management skills to achieve appropriate analysis and planning could be addressed by a training framework. There is merit in considering the need for a register of trainers to ensure adequacy or a Chartered

Institute for Agriculture to encourage best practice. Consideration could also be given to a licensing system for farms, with appropriate requirements for training of all involved in livestock in relation to health and welfare of animals, and HCCP procedures.

Continuing Professional Development (CPD) is a concept not yet accepted by farmers but should be addressed as the needs of businesses will be increasingly demanding. In this context, it is important to recognise the changes that have taken place in the commercialised advisory sector and that appropriate highly skilled unbiased support is not always available.

c) Professional and technical advisors.

The serious concerns over the future of rural mixed veterinary practices, highlighted in various central reviews on the profession, cannot be underestimated. Other countries, such as the USA, have recognised the problem and now have specific programmes encouraging food animal veterinarians. Such approaches are worthy of consideration in the UK. Veterinarians continue to adapt to the needs of livestock farmers in that they have moved from being reactive to being more interactive and will in the future, have to be proactive. The opportunity to work with other specialist advisors in support of individual farms or with groups of farmers is proving beneficial and should be encouraged.

Over the last two decades, considerable progress has been made in genetics which has contributed to increased milk production. However, it is argued that nutritional practices have not shown the same rate of development. Whilst genetics have created the potential, nutrition has failed on many farms to deliver opportunities. The Forum considers that there is an acute shortage of well-trained animal nutritionists and geneticists who understand the science of ruminant nutrition and the need for an integrated farm planning strategy to balance nutrition, genetics, management, environment, animal health and welfare, with product quality and provenance to quantify.

There are numerous other purveyors of knowledge who influence farmers. The range includes milk-buyer personnel, inspection officers, technical and trade representatives from the wide breadth of the supply trade and consultancy groups. In order to ensure the quality of advice, which currently varies considerably, the Forum urges industry to again consider some form of accreditation.

Comment

This document is based on the firm belief of the members of the Dairy Science Forum that there is an opportunity and a pressing need to build a profitable, innovative and competitive UK dairy industry, which will meet consumers' needs. The UK food chain, including the dairy sector is evolving as it consolidates and rationalises. There are many positives. Farmers are engaging more effectively with the food chain; an essential development as they are increasingly exposed to market forces and a competitive environment.

But dairy farming has to be profitable if there is to be investment for a future, and that must include successful training schemes. Biosecurity and food security are vital requirements. The days of food surpluses are past and for many countries, food supply is now paramount.

Given the opportunity, (and a number of important barriers to progress have been highlighted in this paper), the industry will make a net positive contribution to the environment and contribute to the long-term sustainability of rural communities.

**The Dairy Science Forum
December 2008**

Appendix 1. R&D to Support the Dairy Sector

The past 10 years has seen profound changes in the level of research funding, the priorities for this funding and the capabilities to deliver research in support of the dairy industry. For example, DairyCo (formerly MDC), R&D funding has fallen by 80% in the last five years; Defra's R&D funding for animal science has fallen by 20% in the last 10 years. Overall, R&D funding for animal science in the UK is well short of the EU target for overall research funding of approximately 3% of GDP by 2010.

While funding for dairy R&D has been falling there have been significant, but somewhat incoherent, changes in the research infrastructure. The loss of major research Institutes, such as the Hannah Research Institute in Scotland and Bridgets EHF in England, has occurred while there has been significant re-investment in research infrastructure in Reading (CEDAR) and Nottingham Universities and, to a lesser extent, in SAC.

The strategies of major funders suggest that there is continuing commitment to the farming industries. For example the strategic objectives of Defra include (achieving) 'a thriving farming and food sector with an improving net environmental impact' and 'a sustainable secure and healthy food supply'. BBSRC funding aims to 'underpin practical solutions to major challenges such as climate change, food security, healthier ageing, and the control of infectious diseases'. However, these strategies outline the future in respect of the farming industry as a whole rather than specifically in support of the Dairy Industry and the reality is that significant funding for the dairy sector has not followed from these broad-brush strategic statements. Rather funding is largely being directed into environmental management (Defra) , systems biology and molecular sciences (BBSRC).

Recently, the AD Little Consultancy have been asked by DEFRA to identify capabilities and to assess these capabilities against Defra's current and future needs. This report is due shortly. However, the assessment was not informed of future demand by DEFRA nor any other funding agency.

The Dairy Science Forum strongly believes that the future priorities of the industry, R&D funding and capabilities need to be matched, properly planned and coordinated to provide the R&D needed to support the Dairy Industry and its delivery of public goods.

It is now opportune to bring together the future research plans of the funding bodies and to apply these specifically to the Dairy Industry and to use this information to take forward the AD Little recommendations to DEFRA in relation to the future capability needs in support of the dairy industry in the UK.

We believe the Dairy Science Forum is in a unique position to help facilitate this debate given the experience and independence of its members. We therefore propose to organise, as a first step, a workshop with the following aims;

To consider:

1. Potential private and public goods outputs of the sector over next 10 - 15 yrs.

2. The future R&D and KT spend to enable the industry to achieve its potential outlined in 1. above.
3. The priorities within this spend.
4. The adequacy of UK R&D and KT capabilities to delivery this vision.

The Dairy Science Forum will seek support from Industry bodies for this workshop and aim to publish the outcomes to inform the funding bodies in the UK.

Appendix 2. Research requirements and opportunities

The Forum believes that dairy research should focus on *healthy animals, quality product* and *sustainable environment*. The following paragraphs are not intended as an exhaustive list of requirements but indicate key areas which contribute to the future sustainability of the industry.

Environment

- Climate change will influence world milk supplies and returns. The UK needs to be able to seize the emerging opportunities from this globally changing situation. Practical solutions to the problems relating to the carbon and environment impact of milk production are urgently needed. New technologies for carbon and methane reduction in dairy cow rations need to be identified.

Health and welfare

- Lameness, mastitis, fertility and behavioural issues, as well as a range of infectious diseases, continue to incur huge financial losses and thus rank highly in the list of priorities.
- Whilst there is a need for renewed emphasis on improving genetics (including genomics), longevity, the need for appropriate housing and management systems for present-day dairy animals is critical and impinges on the health issues. These will maintain the confidence of retail customers in terms of welfare, provenance and food safety which all remain critically important.
- The impact of animal health on milk quality needs further study, particularly from economic and ethical standpoints.
- There is also an urgent requirement to increase the understanding of the concept of proactive health planning, as opposed to the simple production of health plans. The opportunity exists to develop IT based systems to support the farmer/veterinary/adviser partnership, an essential element of any future sustainable farming business and to create reliable databases to allow delivery of more than anecdote. Economic benefits derived from positive health planning need to be more clearly defined to ensure that the concept is widely adopted.

Production systems

- Advances in plant breeding have produced grass species that are more efficient and produce less nitrogen, but the changing climate raises the need for drought tolerant fodder crops, such as maize. There is also a need to counteract methane production.
- The longer-term effects of new systems (such as extended lactations, robot milking and all-year-round housing) require detailed examination in terms of animal welfare, environmental impact and customer acceptability.
- Nutrition, as previously discussed, will have an increasing influence on not just the performance of dairy cattle, their fertility, health and welfare, but also on climate

change, waste disposal and water quality. Improved nutrition is also one of the key steps to reduce the contribution of cattle to gas emissions (a seeming current pre-occupation of Government).

Agri-business

- An economic research base for a sustainable dairying business and supply chain should be a priority.