Opportunities for Ireland in a changing global sheep industry

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Introduction: Global situation and prospects for sheep meat

There is no doubt that the sheep world has changed in the last decade. Trends show declining numbers in the main exporting countries, against a backdrop of a growing world population with an increasing demand for protein. Internationally sheep are largely reared on pasture and inputs of grain and are minor, especially compared with beef cattle. Hence high prices for grain have a much less direct impact on sheep producers, although the increase in other commodities such as energy and fertiliser does impact.

When looking at the 'modern' industries there are both common and different causes of the decline. New Zealand is the major international exporter of sheep meats, exporting more than 90% of its sheep meat production. There the fundamental reasons for the dramatic decline in sheep numbers have been land use change to dairying and forestry, driven by the higher returns to dairying and land-use drivers on poorer quality land with forestry. The pressures have been associated with declining relative returns for sheep products compared with dairy products in world markets, exacerbated by a continual decline of the international wool industry[1]. However, despite the decline in ewe numbers[2], lamb meat exports have been relatively resilient (peaking at around 430,000 tonnes during the 1980's) and totalling about 350,000 tonnes (bone-in equivalent) in 2010[3]. Poor returns from wool enterprises and persistent drought (except 2010/11) have impacted on the viability of land for sheep production in Australia, resulting in destocking and/or land use changes (to cropping) (Anonymous, 2009). Increasing issues with sheep health (parasites and flies) are also major challenges impacting heavily the industry. While the numbers of lambs slaughtered are comparable to New Zealand, carcase weights are higher and, in contrast to New Zealand, there is a major domestic market for lamb meat, which has underpinned the market making sheep farmers less reliant on more volatile international prices (Anonymous, 2009). However Australian wool is completely exposed to international markets.

The decline in the UK and European flock has resulted from a combination of decoupling of subsidy payments to number of ewes, the recent foot and mouth disease outbreak (especially in the UK) (Allen, 2010), challenges related to environmental sustainability and increasing input and compliance costs, and the pressure on producer prices.

China has the largest sheep population in the world with around 130 million sheep producing around 350,000 tonnes of wool[4]. In the two decades from the mid-1980's, the total meat production in China increased four-fold, while sheep meat increased from 2% to 3% of the total[5]. India has a very large population of sheep, some 65 million, which contribute greatly to the local economy through subsistence

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[1] For example, wool production is now around 50% of the 1980's peak at 170,000 tonnes in 2009-10; however the actual price (per kg) has been at about the same as the 1980's average through most of the last decade, although it has increased in the last year.

[2] This has declined from a peak of over 40 million breeding ewes to 21.7 mn ewes in 2010 (ewes are about two-thirds of total sheep wintered); by comparison Australia runs about 72 mn sheep (http://www.abare.gov.au/outlook/_download/meat_morris.pdf;

[3] In addition around 85,000 tonnes of mutton was exported (Beef + Lamb New Zealand 2011, Compendium of New Zealand Farm Facts); this compares with around 179,000 tonnes of lamb meat and 201,000 tonnes of mutton exported from Australia in the 2009 year (National Farmers Federation, http://www.nff.org.au/commodities-sheep-meat.html)

[4] *www.comcom.govt.nz/.../Cavalier-Wool-Bell-Gully-Annexure-A-Market-Strategy-**China**-Wool-Industry-**Statistics**-Submission-on-Cavalier-Wool-NZ.*

[5] Pork from 82% to 65%, chicken from 7 to 13%, and beef from 2 to 9% (Waldron *et al*, 2007: China's livestock revolution: agribusiness and policy developments in the sheep meat industry; CABI International).

farming contributing to local food security, especially in the arid/semi-arid and mountainous areas where crop and /or dairy farming are not economic. Exports from India constitute 1% of the global trade (Anonymous, 2009). Over and above all of these external drivers, sheep production is generally characterised by high labour and animal health costs, and sheep meat is relatively expensive in the market compared with other proteins. Sheep production is now facing a new challenge from Governments dealing with Greenhouse Gas (GHG) and carbon costs.

However, there is much to be optimistic about. Declining sheep numbers and increasing international demand for protein (which have increased protein prices, especially evident in the dairy prices), have resulted in a tightening of global supply and an increase in the farm gate price. These changes are presenting new market opportunities for trading countries. Whereas the production and consumption of sheep meat in the developed world has stalled, future growth in sheep meat consumption through urbanisation and increasing income level is expected and is likely to be focused on the developing countries of South America (Brazil), the Middle East, India, and China, which have exhibited a preference for sheep meat (Anonymous, 2009).

Current practices and direction of breeding

With increasing global demand, and reduced supply, there are two basic questions:

- Who can fill this demand, and what can emerging countries offer?
- Where do sheep fit in the wider scheme and what practices and breeding strategies are being employed by the major sheep meat exporters in light of a different sheep world?

Sheep are a relatively small animal (lower meat yield per carcase and higher slaughter and processing costs per unit of meat produced) with a relatively low reproductive rate (compared with their non-ruminant competitors), require a higher quality of feed than cattle to perform satisfactorily in a meat production system, and are relatively susceptible to internal parasites. Overall a relatively high proportion of their nutrient intake is utilised for maintenance of the breeding female, and saleable meat yield per unit of feed is at the lower end of meat-producing systems. However on the positive side, they are a very effective utiliser of grassland. The overall reality is that these features of the sheep generate major competitive pressures with other land uses and focus pressure on the development and application of technologies to increase reproductive rate and reduce animal health costs. Hence to provide an economic option, the relative price of sheep products must be relatively high compared with the alternatives. The co-products (hides, wool, non-carcase edible components) have a major effect on the prices received by producers, and the impact on the profitability of the enterprise is profound.

International demand for meat and non-carcase components shows little sign of diminishing, although there are always fluctuations in price. The decline in ewe numbers in the major sheep-producing areas has been partly compensated by increasing per ewe productivity, and this has been especially evident in New Zealand[6]. The main opportunities for increasing supply are likely to be Brazil, Russia, India, and China, where there is major scope for sheep to utilise natural or improved grassland. However, there are few global markets in which products would compete directly (with New Zealand, Australia, and UK) on quality. In addition, growth of China and India's local demand is expected to continue and so match (and likely outgrow) production, leaving little surplus for export (Barnard, 2006).

New Zealand and Australia account for 88 percent of global shipments of sheep meat (Anonymous, 2009). While NZ is the major contributor to world trade (Allen, 2010), the sheep production system is not economically competitive on approximately 50% of the current land it occupies (Rohloff, pers. comm.),

[6] In New Zealand, in the period that ewe numbers have halved, lamb meat production has declined by around 15%; http://www.meatnz.co.nz/main.cfm?id=112&spid=505)

when compared to dairy. In addition, there has been a dearth of technologies ready for sheep farmers to use, as a result of lack of basic research and lack of technology transfer to the leading farmers.

In our view, for sheep production to truly be competitive, and for New Zealand to influence the world supply/demand situation, technology investment and extension, resulting in further productivity increases, are needed. While significant improvements in ewe productivity (litter size +18 percentage points) and lamb carcase weight (+2.6 kg) have been seen over the last 20 years (Young and Amer, 2009), breeding strategies must now diversify to focus on reducing ewe maintenance as a proportion of total energy demand by capping mature size of ewes, increasing lambs weaned from these ewes per lambing, increasing carcase weights and yields, as well as potential multiple lambing events within a season. Further, breeding objectives need to expand to include a much wider range of performance traits that represent an opportunity for farmers to further optimise animal performance and to define a market difference (Byrne et al., 2011, In submission). Recent research to establish which traits have a positive impact on carbon emissions (Ludemann et al., In Submission), and to establish the genetic basis for product (meat) quality has been published (Clarke, 2010). While the focus of genetic improvement has been on prolificacy, growth (selection) and reducing labour costs (culling), there is a need for both breeders and commercial farmers alike to employ strategies to improve health and meat yield/quality traits. The issue remains that sheep farming land is under extreme pressure in New Zealand.

The proportion of lamb that is exported from Australia has doubled over the last decade, now exporting 68% of its lamb production (Allen, 2010), constituting 39% of the worlds' traded sheep meat. Growth in export markets driven primarily by live animal exports to the Middle East has driven breeding strategies toward a greater focus on meat production than the historic focus on fine wool (Anonymous, 2009). Australia as one of the 'modern' industries faces continuing persistent drought conditions (with the exception of 2010/ 2011) as the most notable challenge impacting on their ability of ramp up production. Further challenges relate to the significant impact fly strike has on animal performance (and the associated animal welfare issues), and a continued reliance on Merino and Merino crossbreds as maternal breeds for meat production. Traditionally, Merino breeders have a much lower rate of genetic gain than that of terminal sire breeds or specialist meat maternal breeds in Australia. Breeding objectives in Australia are focused on managing animal health, wool quality traits, and advancing the sheep meat industry through genetic improvement in growth rates and carcase traits. There is little doubt that the challenges of drought and disease will continue to impact of the production potential of Australia's sheep industry.

In spite of the EU being only about 80% self-sufficient in sheep meat, predictions are that EU sheep numbers are expected to continue to decline over the next 10 years. The current situation is of a high cost industry with a production profile that hinders the ability of sheep farming to compete with more attractive land uses. With a reliance on housing, high cost diets (grain and meal) rather than pasture, and high labour costs, even the top third of lowland flocks produce a negative net margin on their sheep business (Allen, 2010), and continued pressure on the profitability of sheep production in the UK and Europe must be expected. Over the past 20 years there have been improvements in the performance in the UK, with an increase in litter size of around 6 percentage points. However this is well below the genetic potential. While there are specialised sire and dam breeds used in crosses, the within breed strategies have been focused largely on improvement of terminal sire traits and the use of terminal sire breeds as maternal sheep. Some breeders claim that this has tended to result in sheep that are deficient in terms of soundness and longevity. Currently, breed improvement programs in the UK include the use of genetic evaluations for growth, carcase quality, litter size, faecal egg count, and a few maternal traits (lambing ease and maternal milk), but the industry has been slow to adopt genetic improvement opportunities. Our view is that the UK and Europe will struggle to capitalise on the changing sheep world, unless there is a fundamental shift in the production system, with the primary factor being an increased use of pasture Breeding strategies must also focus on improving traits which contribute to profitability such as health, low labour requirement and longevity, and the parallel utilisation of these genetically improved animals.

Brazil, India, and China represent developing countries with significant opportunities to improve production and performance in sheep production systems. These countries have major scope for sheep to utilise natural or improved grassland, and to introduce genetic improvement programs. However, the dominant feature of production systems and livestock industry structures is the small flock sizes and fragmented nature. These factors pose technical and economic constraint on industry development, disease control, genetic improvement, and overlying these, extension. Genetic improvement programs have relatively minimal penetration and adoption in India and China, while Brazil is in the very early stages of implementation. In the near future demand from these countries will likely not be fulfilled by domestic supply, so opportunities exist for exporting nations.

Current practices and direction of technology

Evidence demonstrates that massive improvements can be made if technical developments and research solutions are adopted and encouraged through knowledge transfer of best practice. In this respect, benchmarking, by revealing the drivers of productivity and profitability, has proven to be of value in showing farmers the benefits of implementation of better practices and technologies in New Zealand. However despite this, it has had relatively little impact on a wider scale, although some farm consultancy practices do utilise it. Aside from the use of genetic improvement technology (genetic evaluation methods) and those technologies that improve the accuracy of genetic improvement, there are many other technologies that can improve the efficiency of farm management.

Technologies which provide the opportunity to significantly improve efficiency and profitability on farm include electronic identification, pregnancy scanning, live weight recording, and automated drafting. The value of some of these technologies has been shown in the Irish sheep breeding schemes, Maternal Lamb Producer (MALP) groups and the Central Progeny Test (CPT). They allow valuable performance data to be collected for genetic evaluation but also provide farmers with information which impacts on key performance indicators. A technology which has impacted on the way farmers are rewarded for carcase quality is VIA (video image analysis) of carcases along with the associated payment for lean meat yield.

To be convincing, the real value of such tools must be demonstrated on farms. Hence bench-marking has much to offer. The essence of benchmarking is to focus on the recording of flock performance and to then compare across farms – particularly good examples are the comparison of scanning percentage against mating live weight, and lamb growth rate against ewe live weight, where flocks that are above or below the general across flock relationships are easily observed. The information can be provided to farmers anonymously so that they see only their performance as compared with the general relationship. However such information can provide powerful tools to help farmers address their own situation.

For breeders, there are several technologies that can have a major impact on the rate of genetic improvement. These include: genetic improvement schemes (such as Sheep Improvement Limited in New Zealand and Lambplan in Australia); sire referencing (by the use of artificial insemination with young sire teams in the Australian lamb scheme, and link sires in NZ); central progeny testing (to facilitate effective and accurate across flock evaluation); the use of computed tomography (CT) scanning to increase carcase lean content (as an adjunct to ultrasound scanning) used by breeders in NZ, Australia, and the UK; DNA parentage (as used in the breeding schemes for sheep in Ireland) which has enabled a paradigm shift in the management of breeding programs in sheep in NZ as it has removed the constraint of requiring a lambing shepherd to match progeny with dams and has enabled flocks to be lambed under commercially-relevant conditions; associated with this has been implementation of other DNA marker-based technologies for gene variants associated with muscling (MyoMAX® and LoinMAX®,(Campbell and McLaren, 2007), fecundity (Inverdale®) (Davis et al., 1995) and resistance to internal parasites (WormSTAR®). The use of parasite faecal egg counting has enabled ongoing genetic improvement in resistance to parasites in ram breeding flocks – importantly the reduction in faecal egg output reduces the challenge on the rest of the flock.

The development of genomics-based tools represents an opportunity to increase the accuracy and speed of genetic gain through the selection of animals much earlier in life; it also enables a focus on selection for traits that are difficult to measure (e.g. expressed late in life or apparent only at slaughter). However, there are significant impediments to implementation of genome-wide selection, including flock structures and relationships across flocks, and the costs of collecting sufficient phenotypic and genotypic data.

Opportunities for the Irish sheep industry

Ireland, like New Zealand, exports a large proportion of the lamb it produces (BordBia, 2010). With falling numbers of sheep in continental Europe (Ireland's main lamb export destination), and the good reputation Ireland has as a lamb supplier in Europe, there are opportunities to capitalise on market conditions. In the near to medium term, current strong prices are likely to hold, but lamb is already marketed at premium prices, and competing livestock systems will also be receiving premium prices while competition for cereals will keep concentrate feed prices also at high levels.

Ireland's sheep industry shares many of the characteristics of the UK industry. It is high cost, with large portions of it reliant on grain or concentrates for lamb finishing, and has been slow to adopt genetic improvement opportunities. The major challenges facing the Irish sheep industry include the part time nature of sheep farming, lack of scale, increasing compliance costs associated with environmental sustainability, high labour input costs, high capital costs associated with management systems, and increasing competition in markets. These factors have contributed to poor profitability in sheep farming operations.

Previous breeding strategies have been focused largely on improvement of terminal sire traits and the use of terminal sire breeds as maternal sheep (Byrne et al., 2009). As with the UK, sheep in Ireland lack functionality. For the Irish sheep industry to be profitable, it has to be competitive with other land use options. This is going to require changes in farm management and improvements in genetic evaluation and therefore animal performance/productivity. Performance recording and breeding of rams must also focus on the end use for slaughtered progeny. Breeding strategies must focus on improving functionality traits (health, low labour, longevity), and the uptake and use of genetically-improved animals must be increase. Fundamental changes are required to the way in which rams are assessed for commercial use. Pedigree rams must be farmed in a commercial environment so that data records and genetic evaluations represent assessment of merit for animals that are fit for purpose for commercial farmers that are likely to become more extensive.

Sheep Ireland has developed a new genetic improvement strategy encompassing a novel breeding scheme aimed at increasing uptake of performance recording by breeders and the use of improved rams by commercial farmers. Underpinning these new breeding initiatives are major developments in national breeding objectives for maternal and terminal sires, and an across breed genetic evaluation system integrating data from both pedigree breeders and commercial farmers. The scheme is built around commercial farms and is focused on practical and producer-driven recording. The MALP group scheme uses leading technology in identification and DNA to increase the accuracy and efficiency of data capture and recording. It is hoped that this scheme will accelerate adoption of genetic improvement technologies by breeders and drive commercial famers to provide accurate purchasing signals when purchasing rams. The opportunity for the Irish sheep industry lies in the rapid uptake of genetic improvement technology by pedigree breeders, combined with a focus on improved grassland management and a reduced reliance on grain-based feeding. It is critical that pedigree breeders appreciate the value of genetic improvement and the requirements of the commercial farmer for a profitable system and ultimately the end market. Over and above this, the use of adjunct technologies that can be applied on-farm to increase efficiency (e.g. culling of poor performers), and reduce costs on farm (cull for persistent lameness) will significantly increase the competitiveness of the Irish sheep industry. These will not only be required, but will be essential if the Irish sheep industry is to play a role in the future of the sheep world.

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