IMPORTATION OF BOVINE SEMEN TO JERSEY

Prepared for

Department of the Environment

FINAL REPORT

promar International

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EXECUTIVE SUMMARY

- Milk yields per cow (shown as a 305 day standard lactation) on the Island show little progress in comparison to Jersey herds in the UK

- The current genetic position shows that the genetic base of the UK Jersey herd is estimated to be +430 litres, +0.50% fat and +0.17% protein in relation to the Jersey Island Jersey herd

- With a much smaller population to select from, there is also a lack of strength in depth within the bull population of the Island Jerseys

- As the choice of quality bulls available to the Jersey Island farmer falls further behind those available by using internationally available bulls, used upon the Jersey Island cows that are already behind on their genetic ability, so the gap in dairy herd genetic ability will grow with each generation bred

- Using better genetics essentially improves efficiency of production. Generally, farmers use that improvement to improve output per cow, as that is a means to increase business turnover without the heavy investment in land, buildings, silage and manure capacity

- Half of all calves born are Jersey bull calves, most of which are disposed of at 24 hours of age. Approximately another 25% of calves born are heifer calves, but sired by the Jersey stock, bull rather than a proven bull and these too are disposed of. Together this means approximately 2,000 new-born calves per annum are disposed of in Jersey

- The import of semen from cattle breeds other than Jersey will be a possibility if imports are allowed. The Jersey breed is well renowned for their ability for easy calving of crossbred beef calves, however, beef production is likely to remain a niche operation, as the cost of land for many is too high to profit from a grass fed beef production system, and the cost of grain for a cereal based feed system is prohibitive. The margins to be made from breeding surplus heifers for export are likely to be much more profitable than breeding for beef production

- Semen trading itself, with its rigorous health checks, has not been associated with any disease outbreaks around the world

- Only animals that are registered as pure Jersey breed on the Jersey herd book by the RJA&HS will be allowed to sell their milk to the Jersey Dairy. This is critical for Jersey Dairy to be able to sell all of their milk products with the "Protected Designation of

Origin" (or PDO) status that is currently sought and that will enable them to market their products in higher added value markets in the UK and wider

- Animals bred by the technique of embryo transplant and imported will not be registered in the RJA&HS herd book and so they will not be able to sell their milk to Jersey Dairy

- In effect, there is an extended worldwide family of pedigree Jersey cattle who are all part of the same gene pool. Take for instance the recently dispersed herds that were sold to the UK. Although they are now in England, they are just as related to the cows in Jersey as they were before they left and their offspring will be just a related to the Island stock as they would have been had they been born In Jersey. This is the essence of genetics; it is about relatedness, not about geography.

- There is a growing disparity in the efficiency of milk production with the UK (and others). That would mean over time that the price of milk would have to rise faster than it would have otherwise, in order for a farmer to make the same profit. Alternatively, the taxpayer would have to subsidise milk production even more than it already does. That would hasten the economic argument for liquid milk imports

- It has taken a long time for this issue to be decided upon, since the report by Dr Maurice Bichard 5 years ago. There will also be a gradual loss in business confidence and less enthusiasm for the dairy farm industry by potential new farmer entrants. That was being expressed in interviews with many of the businesslike farmers when Promar International interviewed a good cross section of them two years ago

- If the Island took up the challenge of breeding heifers for export, then they could peak at up to 1,000 head per year with a full take up of the use of Jersey sexed semen

1. INTRODUCTION

1.1 Context & Objectives

Promar International Ltd[1] has been asked by the States of Jersey to consider and report upon the advantages and possible disadvantages of importing bovine semen into the States of Jersey. The States government is now seriously considering this issue, after some 200 years without any importation of foreign cattle (and also of their embryos, ova and semen).

The dairy cow population on the Island has shrunk from around 5,500 cows in around 1,000 small herds in the mid 1950's, to around 3,000 cows in 29 herds today in 2008. Milk output then was 12 million litres per annum and has grown and then since shrunk back again, to around 12 million litres, as the available milk and milk product market size has changed.

Whilst milk yield per cow has risen over those decades, the pace of improvement is now very flat in comparison to the rising efficiency of Jersey cows in the UK and further abroad. This is shown in important traits, such as 18% lower milk yield per cow, and with lower butterfat content of that milk.

The considered view of geneticists is that a population of 3,000 cows is much too small for a successful cattle breeding improvement programme, one that allows the breed to continue to improve and become more efficient. That is even if all cow breeders on Jersey embraced the need to use young trial bulls and test their progeny, which did not happen in the past during the 17 years of the Jersey bull proving scheme.

As a result, the genetic ability of the average Jersey cow population is practically static. That removes one tool of improving milk and feed efficiency from the commercial dairy farmer in order to combat ever rising farm input costs. So, in order for the average dairy farm to remain profitable, the price of milk to the consumer will have to rise faster than it otherwise would, or the cost to the taxpayer will rise.

In time, this will also increase the price gap between Island milk and that of the mainland. That will increase the economic argument to allow liquid milk imports to the island, with which the Jersey farmer would find it very difficult or impossible to compete.

One solution would be to import Jersey cow genetics (as semen) from the much larger world Jersey cow population, all of which would have originated from the island of Jersey in the first place, many years ago.

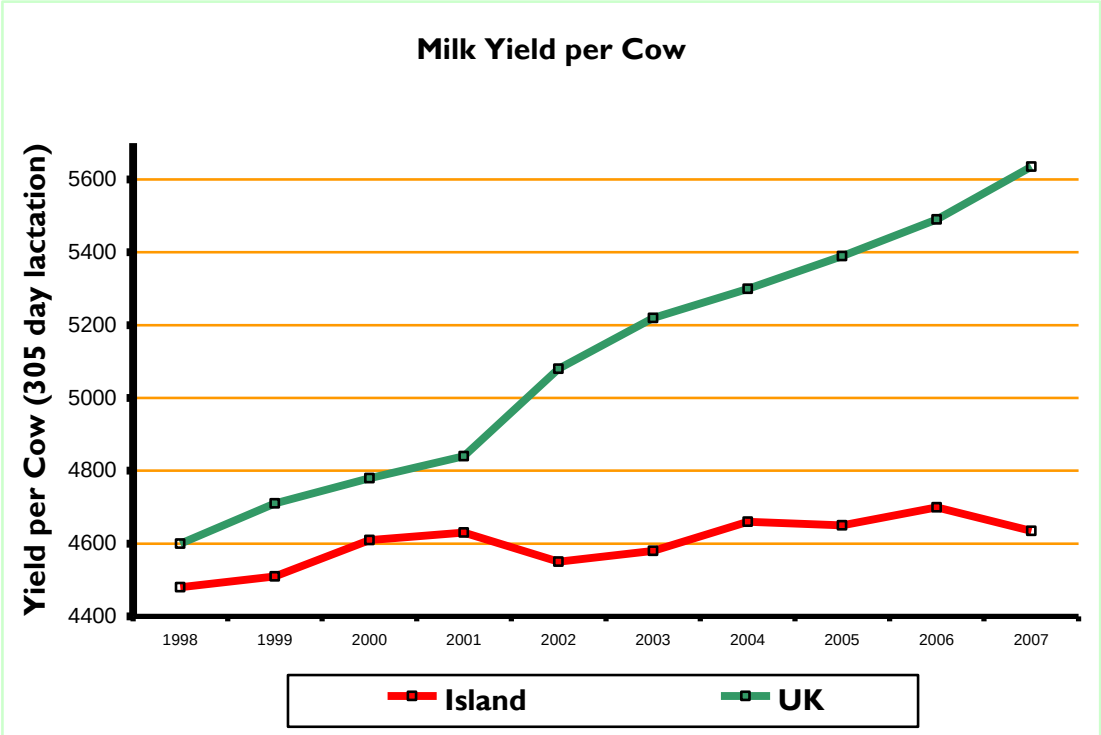
[1] A leading UK based agricultural and food consulting company with especially strong skills in the dairy sector

1.2 Acknowledgments

Thanks are due to all those in the RJA&HS, the Jersey MMB, and the Department of the Environment, Howard Davis Farm, Jersey.

2. BREEDING EFFICIENCY AND IMPLICATIONS FOR MILK PRODUCTION AND QUALITY

The Jersey Island herd has been closed to any imports of cattle, embryos, ova or semen for very many years. Herd replacements are bred from a herd's own unproven bull, or from bulls developed in the Islands own cattle breeding scheme. This is, however, working within a cow population of just 3,000 cows, which as Dr Bichard points out, is too small and as a consequence, genetic progress has been very slow. In its best years, the Jersey Island progeny testing scheme raised the genetic base by 0.6% per annum, in comparison to the 1½% - 2% per annum achieved in a large scale breeding programme, such as in Denmark.



A successful progeny tested bull selection system casts its net very widely to find the bull mothers and sires that really are very much better than their peers. The selection process is hard and despite the care to select the best matings to be put forward, on average only 5 out of every 100 bulls reared actually ends up being used for semen collection and for artificial insemination. The result is that milk yields per cow (shown as a 305 day standard lactation) on the Island show little progress in comparison to Jersey herds in the UK, as seen from the graph above.

Bulls are generally ranked upon their "Profitable Lifetime Index" expressed as "PLI". This national breeding index enables selection for improved net margin per cow lifetime and was last updated in August 2007 for the Jersey breed. The PLI for the Jersey breed is weighted by

just under 50% on milk production traits (formerly known as Profit Index or PIN) and just over 50% on the cow fitness traits, as shown below.

The predicted genetic response to selection on the new PLI indicates that cow lifespan will increase, somatic cell counts (SCC) will decrease and that legs, feet and udder traits will all improve. Traditionally, we also talk of the weighting within the milk production trait, shown here broken down into its constituent parts of milk yield (volume,) milk fat, and the far larger weighting for milk protein content.

Relative Importance of Traits in the Profitable Lifetime Index (Jersey breed)	
Milk production or PIN (made up from milk yield 24%, fat 27%, protein 49%)	49.8%
Lifespan	29.9%
Somatic Cell counts	8.9%
Udder	6.9%
Locomotion	4.5%
Total	100%

So breeding bulls and subsequently cows using the factors within the PLI index will increase milk output and milk quality, but also the life span of the commercial dairy cow. Longevity of cows is now more of issue, especially as rearing cost rises, or as the cost of purchase rises. The PLI calculation has a large component based on this and it is also reflected in the locomotion score (their ability to walk well). Farmers can choose bulls to improve longevity. At the moment, there appears little difference in the annual replacement rate of cows in Jersey (at 25% per annum in DICS data) to that in the UK from NMR data.

As recently confirmed by Marco Winters, the Breeding Director of DairyCo (formerly Milk Development Council), it is very difficult to compare the Jersey Island Jerseys with those in different Jersey populations, using PLI. This is because the genetic difference in terms of the non-production components is not known, while even the conversion of production traits is difficult because of the limited sharing of common bulls, and the fact that conversion is against the gene flow that has occurred up until now.

Marco Winters did however make an estimate of the production traits in relation to the UK and the strains of the breed in other countries using "Interbull" performance data (Interbull being an independent organisation which estimates the breeding potential of sires when used in different dairy cow populations worldwide). The table below illustrates the genetic base of the different Jersey populations in comparison to the Jersey island breed.

Genetic base of different Jersey populations in relation to the Jersey Island breed					
	Milk (Litres)	**Fat (%)**	**Protein (%)**	**Total Fat (kg)**	**Total Protein (kg)**
Jersey Island	4,339	5.01	3.81	217	165
Plus					
UK	430	0.50	0.17	46	25
Denmark	562	0.93	0.35	74	39
USA	896	0.22	0.11	57	40
Canada	546	0.37	0.12	46	27

As Marco Winters made clear, the impact of bulls on the improvement of the national herd is only 50% of the future genetics, with the balance being from the dams on the island. However, the changes resulting from the using Jersey bulls from Jersey populations in other countries would be cumulative over generations, with the numbers eventually approaching those shown above. Marco Winters estimated that on the first cross the likely impact on the milking herd is a rise of 240 kg milk, 24 kg fat and 13 kg protein (per lactation).

The figures shown above also illustrate the way in which selection in different countries has been used to meet different commercial objectives i.e. the focus in Denmark has been on constituents to meet demand for exports of cheese and butter, while in the US and Canada the focus has been on yield. The other related issue is that, with a much smaller population to select from, there is also a lack of strength in depth within the bull population of the Island Jerseys.

In summary, as the choice of quality bulls available to the Jersey Island farmer falls further behind those available by using internationally available bulls, used upon the Jersey Island cows that are already behind on their genetic ability, so the gap in dairy herd genetic ability will grow with each generation bred.

As far as the customer, Jersey Dairy is concerned, more milk per lorry pick up will lower transport costs, and higher fat and protein percentages will improve manufactured product yields from raw milk.

One of the issues of drawing on a smaller population for breeding replacements is the issue of inbreeding. At the moment, this is not an issue for the Jersey Island herd, due to the number of bulls being used, however, it could be, if farmers try to "catch up" genetically by using a limited number of better bulls that are available, rather than making full use of the large number of superior bulls that exist in the international bull studs.

This could also be the case if imported semen were available, with farmers opting for "the best" bulls available, to try and regain lost ground.

The scale of inbreeding in commercial farm animals is not the genetic malformations beloved of science fiction, but a gradual loss of economic performance. DairyCo (previously the MDC) estimate that each 1% of inbreeding costs 15kgs of milk yield loss per cow each year, with fat and protein depression as well. Moreover, it has a depressing effect upon cow fertility, reducing productive life. Overall, inbreeding is estimated to cost £18 (in 2004, at UK prices) per lactation for each 1% of inbreeding. It is not a slow incremental change either: make a breeding mistake and for that individual cow, her inbreeding level increases considerably.

There is no "magic" level of inbreeding that is acceptable. But it can, and should, be managed in a herd breeding programme, so that top bulls can be used successfully in the herd, but only on the appropriate dams.

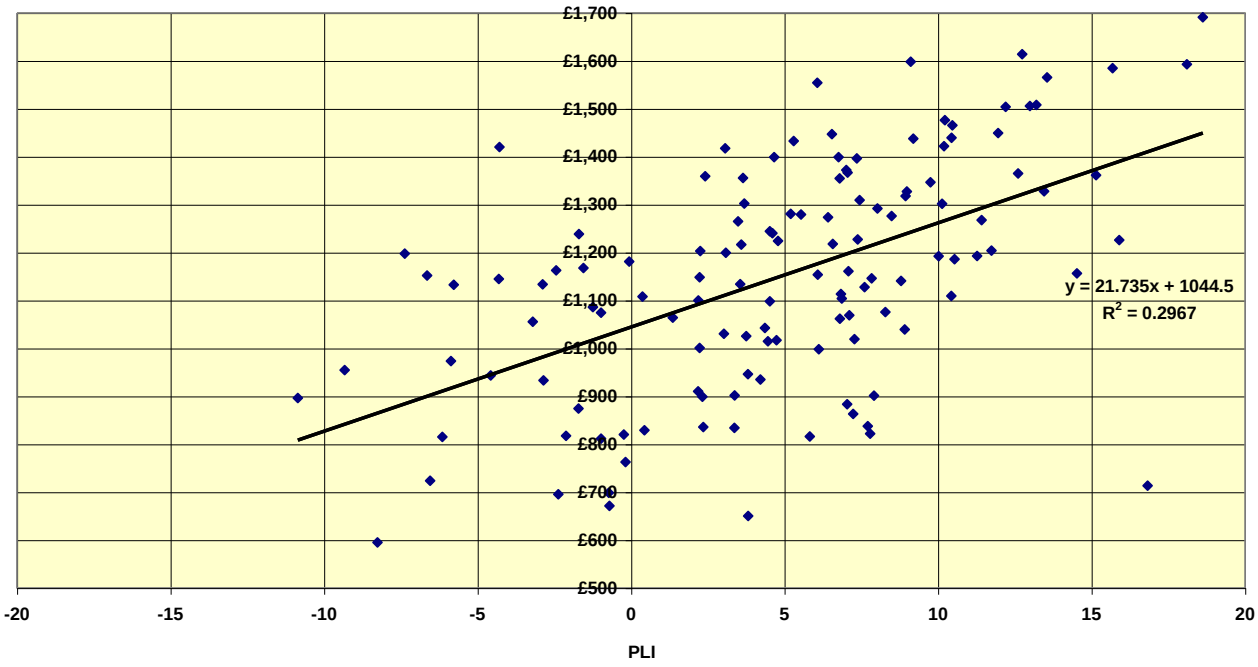
RJA&HS should be able to utilise a database of worldwide Jersey bull genetics, to help farmers plan cow breeding, and so avoid any such dangers. Such programmes are widely used.

3. OVERALL IMPACT ON FARM PROFITABILITY

Business turnover, as milk output, has the major effect on dairy farm profitability, closely followed by the cost of producing that milk. Jersey is a higher cost milk producer by virtue of its size, infrastructure, cost of land to rent or buy, and the cost of imported animal feed. Improved genetics are in fact improving animal milk production efficiency.

All of the data mentioned to date is from milk recording (output) data. Promar International has several hundred herds that use full farm business management accounts (FBA) and that allows us to cross reference their actual cow gross margin performance with their herd genetic potential expressed as £PLI. "Margin", in this case, is all the genetically influenced income like milk, calf, and cull cow income, and costs such as purchased feed, home grown cereals, fertiliser and forage, vet, semen and AI technician services.

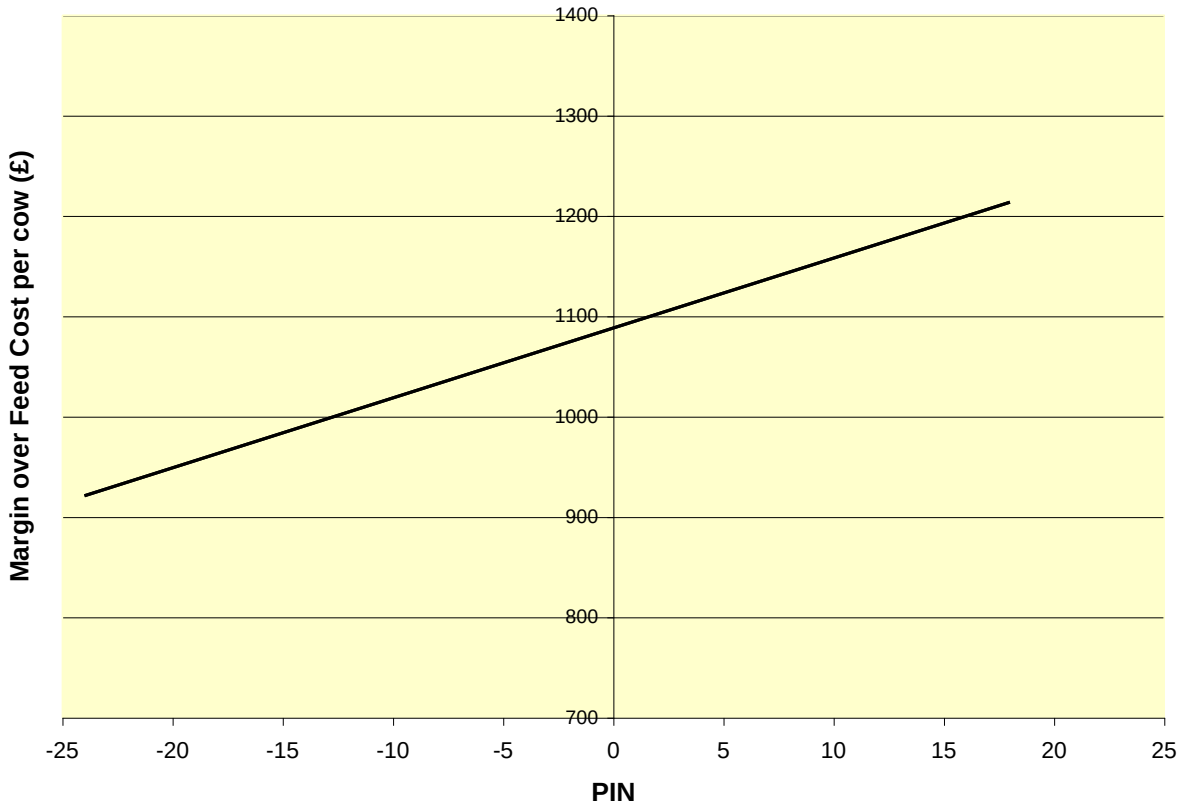
Margin per Cow VS £PLI (using 2008-9 milk and feed price projections)



The above graph of PLI v margin per cow (based on a piece of work completed by Promar for Dairy Co) has used anticipated UK average 2008 milk and feed prices (of 25ppl and £195/t respectively) and shows Friesian Holstein herds only.

This clearly shows that increasing genetic merit raises margin earned per cow, in practice, on real farms. The relationship works out that £1 of PLI is worth on average £6.21 per cow per annum. We do not have sufficient data to do this exercise for the Jersey breed and have found no similar work world-wide for Jerseys, however, we have done this calculation with

Jersey Island DICS data, shown below for the 2005-6 financial year. We have deleted the individual farmer data plots to avoid individual farms being identified.

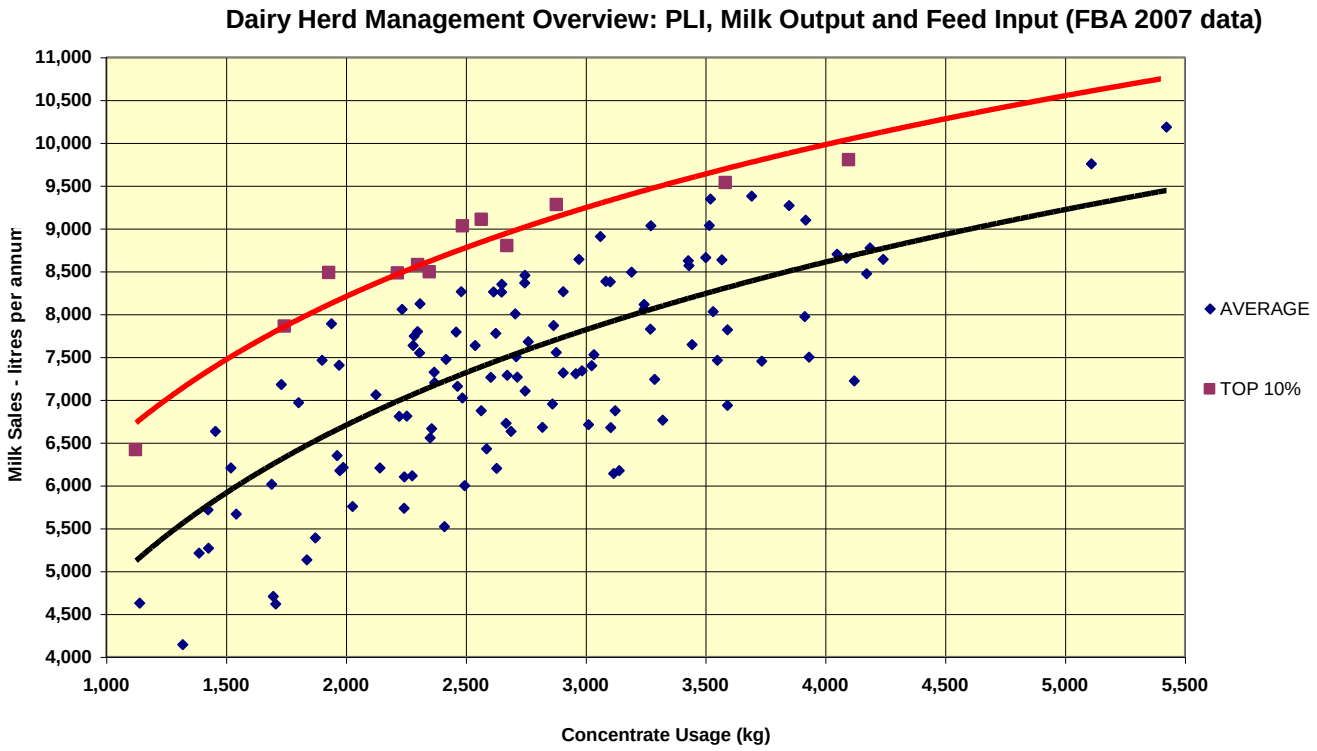


Clearly, this shows the same trend of better financial margins as herd genetic base improves, which in this data suggests an increase of £7 in margin per £PIN, at 2005-6 prices.

Finally, we would like to emphasise that better genetics essentially improves efficiency of production. Generally, farmers use that improvement to improve output per cow, as that is a means to increase business turnover without the heavy investment in land, buildings, silage and manure capacity.

A farmer can increase milk output per cow by feeding more food, by having better quality forage and by increasing the amount of concentrate feeds fed during milking, or when not out grazing. The optimum depends upon the relative cost of feed and the price of milk. In the UK, many farmers have had access to cheap human food manufacturing by-products and home grown grain and some have pushed this to higher levels of feeding. In Jersey, the cost of importing any by-products and animal feeds is very high, so that dairy farmers have to operate at lower feed levels per cow than some farmers do in the UK.

Better cow genetics improves milk production efficiency at all levels of animal feeding, as the following analysis of the same data from Promar FBA cross-referenced with their genetic PLI.



At low levels of concentrate use, the extra concentrate feed is additive to the forage diet and at high levels it becomes more of a substitute, hence the curved response line. The top 10% shown above are selected upon their margin per cow but the herd genetic ability of the top 10% is £37 PLI, whilst that of the average in £14 PLI (all figures are for Friesian Holstein herds).

Good financial performance in the dairy farming industry needs both good cow management and good cow genetic ability, in order to prosper.

There would be other farmer benefits of importing semen:

- there would be the opportunity to use sexed Jersey breed semen
- there would (in time) be the opportunity of exporting Jersey breeding cattle
- there may be an opportunity of crossbreeding those cows not considered for breeding herd replacements to a beef breed instead to produce local Jersey quality beef

At the moment, half of all calves born are Jersey bull calves, most of which are disposed of at 24 hours of age. Approximately another 25% of calves born are heifer calves, but sired by the Jersey stock bull rather than a high quality proven bull. These too are disposed of. Currently, this amounts to approximately 2,000 new-born calves per annum that are disposed of in Jersey. Public opinion about animal welfare is increasingly influenced by such facts and this has influenced several UK direct supply milk contracts with welfare conscious milk retailers to ban live calf exports to Europe by their farmer suppliers, for example.

When semen imports to Jersey are allowed, then the option of using sexed semen also becomes possible. Generally, this will throw 90% heifers and 10% bull calves (against 52% bulls and 48% heifers with normal commercial bovine semen). The principle benefit to the farmer is that of faster genetic progress, as they would breed from fewer, but the better cows and bulling heifers in their herd to get herd replacements. That would then mean a choice of what to breed the rest of the cows to:

- use more Jersey semen to build up a surplus of Jersey breeding stock to export, or

- beef breed semen to serve a small niche market for quality Jersey x continental beef

There is an increasing demand for Jersey cows in the UK, as milk processor contracts for farms supplying manufactured product markets move increasingly to constituent pricing. There is increasing interest in kappa casein content by one of the UK's largest cheese makers, to increase cheese yield and the Jersey cow milk is particularly good for this. There is also a growing interest in cross breeding to get the benefits of hybridisation and again the Jersey x Friesian cross cow brings well-researched benefits. The UK market for imported heifers is currently strong, as we have seen a lack of heifers bred in the last few years of depressed milk prices.

The UK has no likely restriction by milk quotas, partly as it is 1 billion litres down on current quota and the "CAP health check" review is recommending expanding milk quota volumes over the next few years with a view to their removal altogether, however, the prospect of far fewer Jersey bull and unwanted heifer calves to shoot at 24 hours old would be a considerable benefit to the image of Jersey Dairy and of their milk products, whichever of these options were taken for breeding the rest of the dairy herd.

The import of semen from breeds other than Jersey will be a possibility if imports are allowed. The Jersey breed is well renowned for their ability for easy calving of crossbred beef calves, however, beef production is likely to remain a niche operation, as the cost of land for many is too high to profit from a grass fed beef production system and the cost of grain for a cereal based feed system is prohibitive. The margins to be made from breeding surplus heifers for export are likely to be much more profitable than beef production.

4. CONTROL OVER IMPORTS

The imports being considered are of deep frozen bovine semen. Bovine semen has been traded within the EU and between countries outside of the EU for many decades. There is a substantial raft of health regulations and full certification to follow, for the collection centre, the animal's health, the freezing and storage facilities and its transport all the way from origin to user. As far as we can ascertain, semen trading itself, with its rigorous health checks, has not been associated with any disease outbreaks around the world.

The proposed legislation will allow any bovine breed semen into Jersey, as it would not be possible to discriminate by law between individual bulls or breeds, however, only animals that are registered as pure Jersey breed on the Jersey herd book by the RJA&HS, will be allowed to sell their milk to the Jersey Dairy. This is critical for Jersey Dairy to be able to sell all of their milk products with the "Protected Designation of Origin" (or PDO) status that is currently sought and that will enable them to market their products in higher added value markets in the UK and wider.

Animals bred by the technique of embryo transplant and imported will not be registered in the RJA&HS Jersey herd book and so too will not be able to sell their milk to Jersey Dairy.

The arguments by some individuals against the import of bovine semen appear to be:

1. ***That Jersey will lose its "unique" gene pool***. In fact, Jersey does not have a unique gene pool, because it has been sending its genetics all over the world for the last two centuries, both as live animals and as semen. In effect, there is an extended worldwide family of pedigree Jersey cattle who are all part of the same gene pool. The differences that exist between the herds in each country are as a result of selection for particular traits in pursuit of better performance but they are all still pure Jersey animals, controlled through a common system of herd book recording.

   Take for instance, the recently dispersed herds that were sold to the UK. Although they are now in England, they are just as related to the cows in Jersey as they were before they left and their offspring will be just as related to the Island stock as they would have been had they been born in Jersey. This is the essence of genetics; it is about relatedness, not about geography.

2. ***That the import of any semen at all will threaten the integrity of the Jersey Island resource***. It is clear from the needs of Jersey Dairy to market pure Jersey milk and the need to be registered as a pure Jersey herd to sell milk to the dairy, that this cannot happen. There may be some cross bred cattle on the Island, but that does not imply wholesale inclusion of non Jersey breed genes into the Island herd.

3. ***We do not need to improve, what we have is fine***. That ignores the growing disparity in the efficiency of milk production with the UK (and others). That would mean over time, the price of milk would have to rise faster than it would in order for a farmer to make the same profit. Alternatively, the taxpayer would have to subsidise milk production, even more than it already does. That would hasten the economic argument for liquid milk imports.

4. ***We seem to have got on fine by not making a decision at all, why not continue?*** That may also be part of the problem, in that it has taken so long for this issue to be decided, since the report by Dr Maurice Bichard five years ago. There will also be a gradual loss in business confidence and less enthusiasm for the dairy farm industry by potential new farmer entrants. That was being expressed in interviews with many of the businesslike farmers when Promar International interviewed them two years ago. All of this, is just as Jersey Dairy is about to get a new start, with a new efficient factory and exploring new markets with new product lines. The financial answer is as in answer (3) above.

5. IMPACTS ON THE JERSEY HERD IN THE ISLAND

Cow numbers needed for the current level of milk needed for Jersey Dairy will decline on the current milk sales, per cow per annum evidence, by about 15% over time. If the Island took up the challenge of breeding heifers for export, then they could peak at up to 1,000 head per year, with a full take up of sexed semen, though it's more likely to be significantly lower than that at perhaps 2-300 head exported per annum. That is a major new source of income for those farmers pursuing this renewed market.

Alternatively, these extra heifers would also be a potential source of extra milk supply should the Jersey Dairy be successful in expanding in its marketing efforts into UK markets. The number of calves' shot would fall to a few hundred.

The number of heifers reared on the Island could rapidly increase once the pace of genetic improvement has caught up and an export market developed for high genetic merit heifers. These animals would more than replace any reduction in cow number as milk yield per cow rises. That would fulfil the objective of maintaining the breed as highly visible, as the Jersey icon for the tourism industry.

6. EU TRADE RULES FOR AGRICULTURAL PRODUCE (INCL BOVINE SEMEN)

Jersey is caught by the European Community requirements that prescribe the freedom to trade in agricultural produce across member state borders – "the Community rules applicable to the UK for trade in agricultural products covered by Annex I to the Treaty…shall apply to the Islands." There are some exemptions to this presumption of free trade under the circumstances, as outlined in Article 30. This states that "the provisions (to prohibit trade restrictions) shall not preclude prohibitions or restrictions on imports, exports, …justified on grounds of public morality, public policy, or public security: the protection of health and life of … animals or plants; the protection of national treasures possessing …historic …value."

Free, open trade with the EU in liquid milk, would displace local milk and threaten the viability of the Jersey herd. Following a challenge to the Island's milk import controls there was a referral to the EU and a defence of the Island's position was made using the exemptions under Article 30. No judgement was received from the EU and this has been taken to mean that the arguments put forward were sufficiently persuasive.

Jersey regulates milk imports by licence under the Customs and Excise (Import and Export Control) (Jersey) Order 2006, granting such for milk with additives or flavourings that mean it is not describable as pure fresh milk.

Some have linked bovine semen imports to that of liquid milk imports, however the arguments are rather different. It would be less reasonable to justify the semen import ban on those grounds. Many dairy farmers want to import that semen and the ban is not protecting their interests. The extensive EU health controls in place on semen trading prevent invoking any health worries.

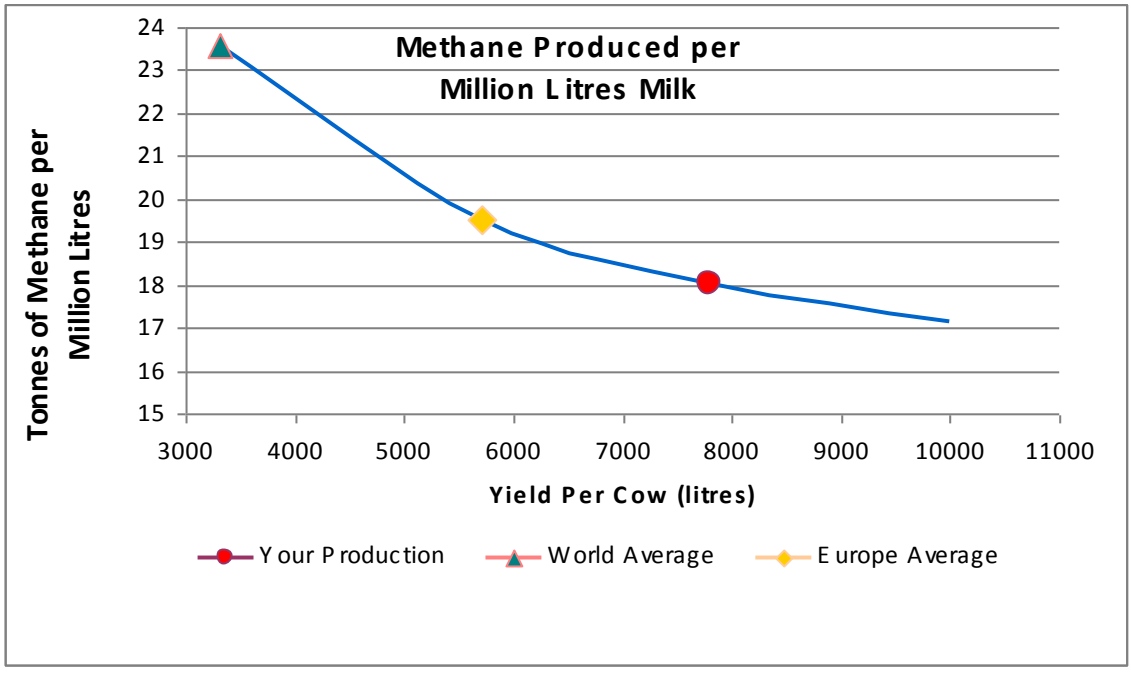
Re-importing the same Jersey genetics that the Island has been exporting for years is not threatening a national treasure. Semen imports will increase the numbers of Jersey cattle on the island, and improve the bio-diversity of land use that has fallen away as the total Jersey cattle numbers have fallen from over 10,000 in the 1950s to around 5,000 head now, especially on the more marginal land.

The Jersey regulatory change to allow bovine semen import is fully in line with the EU legislation regulated by Directive 88/40/EEC, last amended by Commission decision 2008/120/EC (February 2008). That has all of the EU regulation on health and disease controls upon bovine semen trading.

7. ENVIRONMENT

The Island bio-diversity would benefit from the increase in cattle numbers. This is particularly true of the marginal land, for example on cliff tops, now seen returning to bracken.

Methane gas is one of the more serious greenhouse gasses, 21 times as harmful as carbon dioxide. One of the effects of breeding cows of higher genetic merit is that output of milk will rise due to the inherent increase in efficiency of the animal, and so less methane is produced per tonne of milk or meat.



Nitrous oxide is another potent greenhouse gas, nearly 100 times as harmful as carbon dioxide. This is produced from grassland, whether organic or not, by the soil chemistry that is vital to all plant growth. The more starchy diet (with more maize silage fed in winter) of these higher yielding cows means that slightly less grassland is needed, and so less gas is produced per million litres of milk produced.