THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by - Alan Irish - 2007 Churchill Fellow

THE JACK GREEN CHURCHILL FELLOWSHIP for the benefit of people engaged in the Australian Dairy Industry

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Signed:..Alan Irish

Dated:..26th August 2008

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INTRODUCTION

The award of the Jack Green Churchill Fellowship enabled me to travel to the United States of America, Canada, Italy and Israel in order to research the options for the cross-breeding of dairy sheep in Australia with a view to the ultimate establishment of an Australian breed of dairy sheep which is particularly suited to the Australian climate and conditions.

I again express my heartfelt thanks to the Churchill Trust and to the sponsors of the Jack Green Churchill Fellowship for the generosity of the Fellowship and for the wonderful opportunity that was afforded to me to travel to places which I would not otherwise have been able to do. It was truly wonderful to be able to visit the places referred to later in this Report and to meet with the people there who also shared their time, their expertise and their passion with me with great generosity and without reservation.

EXECUTIVE SUMMARY

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Fellowship Overview:

The travel made possible for me by the Fellowship was carried out between the 18th May 2008 and the 5th July 2008.

My aim in constructing the travel details of the Fellowship was:

- to visit two educational and governmental institutions in which the theoretical basis and rationale of cross-breeding programs was likely to be available for discussion and in which the practical application of such programs was being carried out in conditions as close to "ideal" as possible; and
- to visit numerous farms, both large and small, where cross-breeding of dairy sheep was being undertaken at the grass-roots level, in order to discuss the qualities and values of various breeds of dairy sheep and the observed incidences of desirable inherited traits and climatic suitability of the resultant animals to their home environment.

Highlights:

- Visiting the Spooner Agricultural Research Station, a division of the College of Agriculture and Life Sciences, University of Wisconsin - Madison and being able to have very significant discussions with Dr Yves Berger, Head Researcher at the Station.
- Being presented with a fully-documented six year cross-breeding program by Dr Berger who had personally worked out the program for the breeds of sheep which we have available on our farm.
- Spending time with Larry Meisegeier, the President of the Dairy Sheep Association of North America on his farm.
- Visiting Paul Haskins on Swedish Mission Farm which is a top-class facility engaged in sheep dairying and cross-breeding of dairy sheep.
- Discussing the various aspects of cross-breeding of dairy sheep with Larry Kupecz, the President of the Ontario Dairy Sheep Association.

- Spending valuable time at Fattoria Lischeto in Italy seeing again the practical aspects of cross-breeding dairy sheep.
- Being able to visit Dr Elisha Gootwine, Head Researcher in the Israeli Government's Department of Agriculture and Animal Sciences in Bet Dagan, Israel.

Major Lessons and Conclusions:

- That to have a vibrant and profitable sheep dairying industry it is necessary to have milking sheep that are able to produce large quantities of milk during each lactation.
- That the milking sheep used need to be genetically disposed to and be habitual multiple birthers (i.e. twins or greater at each lambing).
- That the best milking sheep in any particular situation or location are those which are crossbred and selected for suitability to the local environmental conditions.
- That cross-breeding dairy sheep is the most practical and economical method of achieving such suitability.
- That the crossbred dairy sheep should have as large a percentage of the East Friesland breed in the genetic mix as possible (bearing in mind the over-riding requirement of environmental suitability) to take advantage of the East Friesland's acknowledged superiority in milk production.
- That dairy sheep are generally better suited to permanent housing in sheds especially designed for their needs than to paddock grazing.

Implementation and Dissemination:

- The principles and lessons learned will form the basis of my own cross-breeding program which has already been commenced on our property at Birchs Bay in Tasmania.
- Observations and results of the program will be submitted to the Dairy Industry Association of Australia for possible publication in the journal
- Details of the program and progress achieved will be passed on to contacts who have expressed interest in becoming involved in the sheep dairying industry and to all interested visitors to our farm and cellar door tourist facility.

FELLOWSHIP PROGRAM

18th - 24th May 2008, Wisconsin, USA

- Spooner Agricultural Research Station, College of Agriculture and Life Sciences, University of Wisconsin - Madison - Dr Yves Berger.
- Swedish Mission Farm - Paul Haskins
- Love Tree Farm - Mary Falk
- Riverview Stock Farm - Larry Meisegeier (President of the Dairy Sheep Association of North America)

25th May - 5th June 2008

- Larry Kupecz - President of the Ontario Dairy Sheep Association
- Upper Canada Cheese Company
- Roseneath Dairy - Elizabeth Johannsen
- Petra Cooper - Fifthtown Artisan Cheese Company
- Old Chatham Sheepherding Company - Tom & Nancy Clark
- Willow Hill Farm - Willow Smart and David Shibrit

9th - 25th June 2008

- Fattoria Lischeto, Toscana, Italy

26th - 30th June 2008

- Dr Elisha Gootwine, Israeli Department of Agriculture and Animal Science, Bet Dagan, Israel
- Nachshon Kibbutz, Bet Shamet, Israel
- Ein Harod Ihud Kibbutz, Israel - Beni Oppenheimer
- Geva Kibbutz, Israel

With Dr Yves Berger, Spooner Agricultural Research Station

BACKGROUND

Shortly after my partner Diane Rae and I moved to Tasmania from Queensland we became very interested in sheep milking and cheesemaking as a new direction and way of life. It was a "sea-change" from our previous professions of financial planning and law.

We were fortunate in being able to obtain a flock of primarily East Friesland ("EF") sheep from a breeder in the northern part of Tasmania and, with financial assistance provided by the Australian Government through the New Industries Development Program, we set up a sheep dairy and manufacturing facility on our farm property in Birchs Bay, 35 kilometres south of Hobart. The EF sheep were chosen for our enterprise as we found that it was acknowledged world-wide that the EF's were the best milking sheep in the world. That is, they were usually multiple birthers - twins or better - and they produced large quantities of milk over a long (approx 7 months) lactation after birthing.

As we progressed into the new venture it quickly became apparent that the EF sheep had one very significant problem. They had very weak lungs. This weakness left them vulnerable to coughs and colds. More importantly, as a result they were more susceptible to pneumonia which, in almost 100% of cases, resulted in death. It also became apparent that this susceptibility was not limited to cold and wet weather. Although these weather conditions brought about the majority of cases of pneumonia, we also noted that rapid changes of temperature and, interestingly, unusually hot days also triggered the onset of the pneumonia.

After a year or two of lambing and milking we realised that this susceptibility was passed on to the next generation. We found that we had very high instances of lamb mortality due to pneumonia. In fact, the lambs were very susceptible even up until they were about one year old. We noticed that once the lambs were over one year old they seemed to survive and progress into the farm program but, with such a high instance of lamb mortality, it was going to be a very long and hard road to increase the size of the flock to the level that we had determined would allow our business to become profitable.

It also quickly became apparent that the higher the proportion of EF genetics was in each animal, the greater was the susceptibility to pneumonia. Animals which were only 50% EF with the other 50% as, for instance, Dorset, appeared to be much hardier animals with a far greater potential for survival. Animals which had 75% EF or greater were much more susceptible and therefore much more at risk. However, the lower percentage of EF genetics also meant that, in most cases, the capacity for multiple birthing and large volume milk production was concomitantly reduced.

This problem of congenital weakness resulting in stock losses was particularly important to us as each of these animals had the potential to produce an annual gross income of about $2000.00 for us over a productive life of six or seven years. It was therefore of great concern and very important to us to try to ensure that our animals survived and grew up to become productive.

East Friesland sheep, Spooner

Awassi rams, Israel

INITIAL RESEARCH

Having come to the realization that the EF breed was not an ideal animal for Australian conditions, we began to wonder what other options there were available to us and what sheep milk producers had done in other areas to overcome the problems with the EF sheep and, indeed, whether the same problem existed elsewhere.

So, in 2004 we travelled extensively throughout Europe and the British Isles visiting sheep dairy farms to see what was being done in those areas and to make an assessment of the global situation.

What we found was that the congenital defect which existed in the EF sheep in Australia was not limited to Australia. Throughout Europe and the British Isles the common problem with the EF breed was the same. The breed had a congenital defect which made them susceptible to chest infections and respiratory ailments. As one sheep dairy farmer in Ireland said to us: "The East Frieslands love to die - all they need is the opportunity!"

However, what we also realized on that research trip was that the areas throughout Europe and the British Isles that were the most successful in producing sheep milk and had a vibrant and extensive sheep milking industry, were the areas that had developed a specific breed of dairy sheep that were suited to the local conditions. In Roquefort, France (the area renowned for the outstanding blue cheese made from raw sheep's milk) the breed of sheep that had been developed for that area was the Lacaune. These were sheep that were multiple birthers, exceptional milk producers but also very well adapted to the local conditions. The same applied in Sardinia where the local breed of sheep was the Sardi. In these areas the sheep milking industry and the subsequent production facilities for yoghurt and cheese were very large industries. One of the smallest producers of Roquefort cheese (there are nine authorised producers all together) processes over eleven million (11,000,000) litres of sheep milk annually!

It was at that point that we realized that perhaps we should be looking to either expand the breeds of milking sheep available in Australia or develop an Australian breed of dairy sheep that was specifically suited to Australian conditions.

TECHNICAL DIFFICULTIES

Having come to this realization we set about to determine what the necessary steps would be to import live animals to Australia or to bring in either semen or fertilized embryos for artificial insemination purposes. We contacted AQIS (the Australian Quarantine Inspection Service) to ascertain the legal requirements.

However, we very quickly realized that neither of these courses would be a viable alternative for us.

Firstly, we found that quarantine requirements for importation of live animals to Australia were very stringent and extremely expensive. The animals would have to be quarantined in New Zealand or another island environment, bred up for one or two generations, and then only the offspring would be considered for import to Australia. Obviously the costs of such a program were prohibitive.

Second, the importation of semen or fertilized embryos was equally as difficult and expensive but for a different reason. In order for semen or fertilized embryos to be able to be imported into Australia it is necessary to be able to show that the semen has been obtained from an animal that is susceptible to the disease called Scrapie. Scrapie is a disease that has, in times past, been prevalent in Europe but has thus far not been experienced in Australia. The rationale behind this requirement is that animals produced from such semen would be susceptible to Scrapie and, were an outbreak of the disease to occur in Australia, they would contract the disease and die without being able to pass it on to other animals as they would do if they were Scrapie resistant. Although such an approach is understandable, the difficulty is that, in order to comply with the requirements the semen from the animal has to be collected, then the animal killed and its brain cells

examined for the Scrapie susceptibility. At first glance this seems to be reasonable until you realize that in Europe animals have been selectively bred for Scrapie resistance for many many years. Consequently finding a Scrapie susceptible animal would be tantamount to a very expensive search for a needle in a haystack with the intermediate consequence being the possible slaughter of numerous animals for no effective result.

FELLOWSHIP RESEARCH

With the above background we realized that the only viable and financially accessible alternative for us was to breed up a strain of dairy sheep using the breeds of sheep that we have available in Australia and to assess those sheep over a period of time to determine their suitability to our local conditions.

Discussions with Dr Yves Berger at the Spooner Agricultural Research Station confirmed our approach. The dairy sheep industry in North America and Canada has experienced similar difficulties to our own and with very similar limitations on the potential solutions. Dr Berger confirmed that it was not only feasible but also preferable to follow such a cross-breeding program using the genetic material that we have available.

Dr Berger advised that from the extensive research that has been carried out in Spooner it is clear that cross-bred dairy sheep have a much greater tolerance for local conditions as well as maintaining the levels of milk production necessary for the establishment and continuance of a profitable and sustainable sheep dairy industry. The results of the Spooner research indicate that it is preferable to keep the proportion of EF genetics in a cross-bred sheep to between 50% and 75% of the overall genetic material. Less than 50% of EF genetics produces animals that lose their regular multiple-birthing capability and have significantly less milk production capacity. Greater than 75% of EF genetics carries through the congenital defect which makes the resultant animals unacceptably susceptible to respiratory problems.

Dr Berger showed me from the Spooner research that cross-breeding between the EF and the Lacaune or Dorset breeds (the Lacaune breed is available in North America) are the best combinations of genetics in the North American climate and conditions. The Awassi breed is not available in North America so they have not been able to try that breed as a cross with the EF.

Dr Berger also very kindly produced for me a six year program setting out all the steps for cross-breeding EF with Awassi or Dorset genetics, both of which are available to us here in Australia. The program is designed to establish a stable breed of dairy sheep after about five years which can then be assessed to determine its suitability to our conditions and its productive capacity. He has also very kindly offered to be my advisor and mentor in carrying out the program and assessing the results. The program that Dr Berger produced for me is set out in its entirety in Appendix 1 to this Report.

The various farms and kibbutz that I visited in Wisconsin, Canada, Vermont, Italy and Israel were a wonderful source of information with practical advice as to the implementation of a cross-breeding program. Information and advice on aspects ranging from best methods for mating animals, programs for mating to achieve longest milking periods, animal nutritional requirements, animal housing, milking methods and systems, lamb raising, practical solutions to control bloat or coccidia, long term milk storage systems and animal and milk transport infrastructure were all freely and unreservedly shared with me.

In particular, it was obvious that in the North American, European and Middle Eastern farming systems a much greater emphasis is placed on permanently housing the animals and using the paddocks for intensive fodder production which is then either ensiled or fed directly to the animals. This system is vastly different to the traditional Australian system in which the animals are grazed on paddocks and only a limited area is locked away for the production of winter feed. Permanently housing the animals has significant advantages for the farm. These are:

- Significantly larger amounts of animal feed are able to be produced as the paddocks are not continually being trampled by the animals which reduces productivity;
- Fencing infrastructure costs are dramatically reduced as there is no need to provide "stock proof"

fences;

- Traditional laneways needed to get the animals from the paddocks to the dairy for milking are able to be used for feed production adding approximately 10% - 15% on to the usable and productive area of the farm;
- The animals' dietary and nutritional requirements can be monitored and adapted so that the animals are getting the right balance of nutrients for their needs. In paddock grazing animals tend to pick out first the grasses that they find the most palatable but which are not necessarily the most beneficial. They tend to eat "dessert" before tackling their "greens"; and
- The animals are more readily available for milking which cuts down on labour costs and allows for quicker processes in the dairy.

The freedom and alacrity with which this information was shared was exhilarating and further fueled our already burning desire to implement such a program for the benefit of our own production and for the Australian industry as a whole. With the establishment of a breed of dairy sheep suited to Australian conditions the industry will become much more viable and attractive as an alternative for dairy farmers who have been forced out of bovine milking due to deregulation or as a consequence of intense competition.

Dr Elisha Gootwine of the Israeli Department of Agriculture and Animal Science was similarly a source of great inspiration and information. Dr Gootwine was the person responsible for the establishment of the Assaf breed of dairy sheep. The Assaf is a breed which was established by cross-breeding EF with Awassi such that the resultant breed is 60% EF and 40% Awassi genetic material. The combination of genetic material in these proportions has provided a milking sheep which is ideally suited to hotter and drier climatic conditions. As a consequence the Assaf has rapidly become the preferred breed of dairy sheep in Israel and also in Spain where there are now over one million (1,000,000) ewes being milked.

Dr Gootwine has confirmed that, in his opinion, the cross of EF with Awassi will be the most likely combination to produce a successful milking breed in Australia. The final combination of genetic material will need to be assessed as time goes by and Dr Gootwine has indicated that he is very willing and excited to assist in that process with information and technical data which we will be able to provide to him from our electronic milk recording system which is used to maintain our animal stock records and includes a daily record of milk production of each animal milked on our farm.

Dr Gootwine also confirmed the conclusions reached by Dr Berger that, according to his research, the proportion of EF genetics in any breed should be kept at between 50% and 75% of the overall genetic material. His research confirmed the research of Dr Berger that such a percentage is necessary to maintain the propensity for multiple births as well as the capacity for large volume milk production over long lactations.

With Dr Elisha Gootwine, Bet Dagan, Israel

CONCLUSIONS

As a result of the Fellowship travel and research I have arrived at the following conclusions:

- That to have a vibrant and profitable sheep dairying industry it is necessary to have milking sheep that are able to produce large quantities of milk during each lactation.
- That the milking sheep used need to be genetically disposed to and be habitual multiple birthers (i.e. twins or greater at each lambing).
- That the best milking sheep in any particular situation or location are those which are crossbred and selected for suitability to the local environmental conditions.
- That cross-breeding dairy sheep is the most practical and economical method of achieving such suitability.
- That the crossbred dairy sheep should have between 50% and 75% of EF genetic material in the mix (bearing in mind the over-riding requirement of environmental suitability) to take advantage of the East Friesland's acknowledged superiority in milk production.
- That dairy sheep are generally better suited to permanent housing in sheds especially designed for their needs than to paddock grazing.

RECOMMENDATIONS

- That we continue in our efforts to develop a true Australian breed of dairy sheep which is suited to the Australian conditions.
- That we encourage dairy farmers who are struggling because of the current state of the dairy industry (deregulation and up scaling) to look at sheep dairying as a realistic alternative.
- That the Australian Quarantine Inspection Service review the current guidelines and requirements for importation of dairy animals, semen and embryos and adopt a more realistic and lenient approach to such importation.

Young Assaf sheep (East Friesland/Awassi cross) Israel

APPENDIX 1

Two-breed Rotational Crossbreeding System using EF purebred rams and EFxAWassi crossbred rams.
(Young ewes are put at breeding at 7 months of age)

Year	Sire	x	Dam	->	Offspring
2008	EFxAW	X	EF	->	.75EF,.25AW
2009	EF	x	.75EF,.25AW	->	.88EF,.12AW
	EFxAW	x	EF	->	.75EF,.25AW
2010	EFxAW (new ram)	x	EF	->	.75EF,.25AW
	EFxAW	x	.88EF,.12AW	->	.68EF,.31AW
	EF	x	.75EF,.25AW	->	.88EF,.12AW
2011	EFxAW	x	EF	->	.75EF,.25AW
	EFxAW	x	.88EF,.12AW	->	.69EF,.31AW
	EF (new ram)	x	.75EF,.25AW	->	.88EF,.12AW
	EF (new ram)	x	.69EF,.31AW	->	.84EF,.16AW
2012	EFxAW (new ram)	x	.88EF,.12AW	->	.69EF,.31AW
	EFxAW (new ram)	x	.84EF,.16AW	->	.67EF,.33AW
	EF	x	.75EF,.25AW	->	.88EF,.12AW
	EF	x	.69EF,.31AW	->	.84EF,.16AW
2013	EFxAW	x	.88EF,.12AW	->	.69EF,.31AW
	EFxAW	x	.84EF,.16AW	->	.67EF,.33AW
	EF (new ram)	x	.69EF,.31AW	->	.84EF,.16AW
	EF (new ram)	x	.67EF,.33AW	->	.83EF,.17AW

Each year, any ewe in the flock sired by an EF ram is mated to an EFxAW ram and any ewe sired by an EFxAW ram is mated to an EF ram. After the 4th or 5th generation, the breed composition of the flock stabilizes, and approximately half the ewes in the flock will be 2/3EF,1/3AW and approximately half the ewes will be 5/6EF,1/6AW.