Pristine Forage Technologies

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Partnership in Building Farm Profits.

Submission to the Agriculture and Food Policy Reference Group

Made on behalf of Pristine Forage Technologies Pty Ltd
by Managing Director, Andrew W. H. Lake

Summary.

Declining terms of trade are a major and growing problem for our cropping industries in particular. Our research and data show that many farmers producing average yields are already making little if any real crop profit, while by reason of much higher average yields per hectare, their international competitors continue to have substantial margins despite cost increases. To remain competitive, farmers will need to adopt new farming systems and technologies; for example using animal production on improved pastures strategically integrated with low input cost cropping. Pristine Forage Technologies (PFT) has developed new varieties and technologies specifically for these farming systems, and their adoption will bring both substantially increased production and profit.

Lack of access to value added markets for Australian rural industry generally also places our farmers at a disadvantage. However, there are opportunities to value add and these can be expected to expand in the future as increased demand coupled with opening up of international markets to value added product gives new options for production and profit for Australian rural industries. For example, animal production offers the opportunity to value add to both crop and pasture on-farm. The potential to increase production and profit from this is huge, as pasture improvement alone could as much as triple production in many regions. Government policy settings need to encourage that development and to also ensure that bulk marketing does not disadvantage value adding, as this is where rural industries as a whole stand to gain most.

Climate variability and change do and will continue to strongly impact on broad acre farm enterprises in particular. This impact can be alleviated to a substantial degree by enterprise diversification and the flexibility that offers; again this is an example of where strategic farming technologies based on integrated crop, forage, pasture and animal production being developed by PFT are foreshadowed to have a major positive impact.

While the market is always right, majority views can be motivated by simple herd mentality and are not always matched by a willingness to pay the additional costs associated with production systems espoused by small but vocal minorities. This can lead to lobby groups using governments to impose production criteria that penalise producers as a whole. We believe it is better to encourage individual farmers to grow and supply a value-added product that meets the particular criteria of the lobby group and thereby attract a price premium to reward the value adding. This ensures that any such market is willing to pay a fair price for the cost of that production, and is not merely making the demands of entire industries in pursuit of some political agenda. Again government policy directions should promote this reward for market responsive, value adding and discourage imposition of regulation or market systems that penalise industries as a whole.

Protection of the agricultural environment is vital for the long-term maintenance of a resource base that is sufficient to underwrite our capacity to farm. While urban myths and beliefs sometimes seek to drive farming systems in the wrong direction in this regard, achievement of the triple bottom line in our farming systems is quite possible and is a major driving force behind development of new technologies, particularly including those of PFT.

Lack of access and resultant low levels of post secondary education among farmers is a major impediment to long-term viability of many farm enterprises. Improved access to education relevant to agricultural industries, including farm and small enterprise business management can increase the rate of adoption of new technologies, improve farmer ability to farm in a viable and sustainable way and increase both profitability and international competitiveness. As these benefits flow through to the entire community, government assistance and investment to improve and promote farmer education is warranted.

Looking forward, many of both the inherent and emerging problems within our broad acre agricultural industries can be profitably and sustainably addressed through adoption of new technologies, diversification, the improvement of productivity, more value adding and better resource utilisation. In particular, the capacity to improve our pastures and thereby increase farm income and profitability across both animal and crop enterprises is huge, and adoption of these strategically operated, integrated farming technologies represents a significant and highly prospective opportunity for our broad acre agriculture. Assisted with appropriate policy settings, this generational shift to more balanced, sustainable, profitable, low risk farming systems will in our view underwrite a significant revival in our agricultural sector, as well as add billions of dollars to regional economies and our export income.

Brief background of Pristine Forage Technologies

Pristine Forage Technologies (PFT) was launched in 1999 as a company focussed on the breeding and selection of pasture and forage legume varieties for use in Australia and overseas, and for the development of new systems and technologies for the exploitation and production improvement of pasture and forage systems. It is based on the cutting edge scientific knowledge and expertise of its senior staff, particularly in pasture and forage legume breeding, agronomy and production systems. This broad knowledge and experience spans several decades and continents and extends from the science of pastures and forages to business management and on-farm animal production.

The driving force behind the launch of PFT was the knowledge that there is enormous potential to improve the productivity of pastures and forages across Australia, and that this productivity improvement was not likely to be achieved through conventional, public sector based channels. Subsequent experience coupled with data collected and analysed by PFT and others have only served to strongly reinforce these views.

Based on this and what are now turning out to be remarkably accurate and prescient industry forecasts, PFT has been able to develop a number of critical new varieties and technologies that have the capacity to revolutionise pasture and forage production systems in Australia. These will bring about radical improvement to the productivity, profitability and sustainability both of broad acre animal production and to crops grown in rotation with those pastures in what we refer to as Strategic Integrated Farming Technologies. Looking further ahead, these varieties and technologies have enormous potential for export into lucrative international markets in North America and Europe in particular.

The motivations of PFT in making this submission to the Reference Group relate to the underlying trends, opportunities and threats revealed by our research, and the factors which may influence our capacity (and those of others) to deliver major improvements within broad acre farming systems across large areas of Australia. We strongly believe that this delivery is vital if many of our farms are to remain viable, but that there are also several significant impediments to that delivery within the current systems of R&D and the development and adoption of new technologies.

Major Issues and challenges

1. *Declining terms of trade, and its impact on profitability and sustainability for major broad-acre cropping enterprises.*

The facts relating to the impact of declining terms of trade on farm profitability are well known. However, we believe they are a major threat that if anything is understated for cropping in particular. Our observations show that many farmers may be hanging on to farming systems heavily focussed on cropping in what is in our view the mistaken belief that their terms of trade will improve, and the equally mistaken belief that their current systems are returning a reasonable real profit.

Average yields per hectare of major broad acre crops in Australia are only a small fraction of those obtained by our international competitors. Rainfall is the principal limiting factor here, and hence this yield limitation is beyond our capacity to control. Upside capacity to improve crop yields is also relatively low, as most crops are averaging about 70% of their rain limited potential. That has the effect of making small increases in costs (which are mostly based on the area of the crop rather than its yield) devastating to Australian farmers, when they are scarcely noticed by most of our international competitors. For example, our analysis, based on various data sets from the Australian Bureau of Agricultural and Resource Economics (ABARE) farm statistics, Primary Industries and Resources SA (PIRSA) Gross Margin calculations and some of our own data for nutrient replacement cost show that growing a 2t/ha crop of wheat (which is the approximate current national average) costs about 1.9t (refer Appendix 1). This compares very unfavourably with an international competitor who produces 5t/ha. Because the costs of most operations are only related to the area and not the yield, this means that he or she has a far larger real profit margin. The only major difference between high and low yield crops is the increased requirement for fertiliser (mainly N) as replacement for that taken off in the additional grain harvested. Therefore, the cost of an internationally marketed 5t/ha crop is only about 2.5t.

Hence an increase in costs of say $20/ha will mean that the average Australian farmer will have his entire profit margin wiped out, while it will only reduce the profit margin of his international competitor by about 5%.

This yield/return discrepancy also means that Australian farmers are confronted by the inability to be able to afford new technologies that will continue to give our international competitors an increasing yield advantage. If for example a particular new technology increases yields by about 5%, but costs $20/ha to implement, then the technology will not give a net return on an average Australian crop, but will give his international competitor an additional $30/ha. This means that the Australian farmer will fall behind, as his international competitor is able to increase both yield and profit while he is unable to do either, particularly as the increased international production will tend to drive down prices.

Thus many Australian farmers are rapidly approaching the point at which we believe it is no longer profitable to grow crops using the present farming systems, while all Australian broad acre farming enterprises are particularly susceptible to ongoing declines in terms of trade.

While most of this is obvious, it is raised here because PFT calculations show that our new ley farming technologies and systems can very significantly increase pasture yields (in comparison to crops, many pastures are only at about 20% of rain limited potential) and hence total animal production and returns. This will also reduce crop input costs (through N fixation, weed control and rotational benefits) in a way that our international competitors currently cannot and which will also result in very significant increases in operating margins and profit (refer Appendix 2). Accordingly with these new farming systems, it will be possible to restore at least a degree of our international competitiveness in cropping, and thereby capitalise on the efficiencies of production which tight margins have already enforced on our growers.

2. Market distortions, tariffs, quotas and subsidies.

All of these issues are particularly relevant to our agricultural export industries.

However, we have no doubt that many others will raise these issues, and apart from their relationship and relevance to the specific points raised above, we feel that for the most part others will adequately canvass their impacts.

The only additional point to be made in this regard from our perspective relates to tariffs and quotas on animal products. Access to these markets is particularly relevant to pasture and forage production systems, as in effect, these production systems allow Australian farmers to value add to their product (animal feed) prior to that product (eg meat) leaving the farm. The increased pasture and forage production that is possible means access to markets for this produce is therefore critical, while this value adding potential in animal industries is further discussed below.

3. Capacity and market reward for value adding.

Clearly Australian agricultural industries and the Australian economy generally can benefit where value adding to base bulk product occurs prior to export, while on an individual enterprise basis, the same can be said for farmers who add value to their product on-farm. However, equally clearly, this capacity is often limited by practical considerations. The obvious example relates to exporting bread versus wheat; transport costs and product quality preservation generally precludes the possibility for export of the former.

However, value adding in its broadest sense can take many forms; from production of an agricultural commodity to particular quality specifications through conversion of low value crops to high value animal product to refining, processing, manufacturing and packaging. We believe significant gains can be made, and some obvious examples include through farmers using their expertise to grow high protein bread wheat or durum instead of feed quality wheat, or finer, low prickle, high quality apparel wools in preference to coarser, more prickly types. Marketing systems should encourage producers in this regard. The tendency of market boards to be forced into the position of accepting all manner of product quality and being pressured into use of higher quality product in blends or for promotion to make lower quality product into something that the market place will accept is noted. This can disadvantage those who do value add to produce good quality product, and pricing structures and/or market segregation which reflect real market value of the higher quality product should be encouraged. We do not believe that is currently always the case where monopoly powers exist (eg wheat), or where vastly different qualities of specific commodities are marketed under the same general banner (eg wool).

As both of these are major agricultural export earners, we believe that market signals need to be closely monitored, and for those signals to be adequately and accurately communicated back to growers, so that they may respond accordingly. For example, the current push by many growers to invest more in marketing wool may repeat what we see as the mistakes of the past and thereby run the risk of further damaging the longer term prospects for Australian wool. In the past, these marketing drives have focussed on the high value end of the market; wool for high quality fashion garments. However, to most retail purchasers, wool is wool and they are frequently induced into buying a woollen garment that turns out to be prickly and uncomfortable, rather than the soft, comfortable, high fashion accessory they saw in the advertisements. Needless to say, many are turned off wool for life.

Generically it as far more important to spend money on getting market feedback to producers rather than on promotion to bolster sales of a particular product or product quality that the market does not really want. On-farm value adding in the form of production of quality, rather than bulk commodity is a good way for Australian farmers to maximise their capacity for profitability going

forward, and their efforts should not be compromised by the bulk commodity production sections of the particular industry.

One major area with very significant potential for value adding on-farm relates to growing high value animal product. In effect, animal production is value adding to pasture or feed grain, and high value animal products such as quality meat represent additional value adding which may result in higher profit margins for producers.

Forecasts of international market demand for meat are all strong, and when coupled with being set up for cheaper production systems based largely on extensive grazing, Australian farmers enjoy an up-front advantage in these industries. Further, in contrast to cropping, costs are much more closely related to the units of production rather than to production area, and hence Australians are not any more disadvantaged by declining terms of trade than their international competitors. Further, as international markets open up, meat prices to Australian producers are likely to increase significantly, as Australian meat prices are among the lowest in the world.

When coupled with the enormous capacity to increase both the productivity and quality of Australian pastures, PFT sees increasing potential for producers to access the benefits of value adding through meat production, and thereby to increase their overall profitability and long term viability. Apart from the need to build this production capacity locally (which is a major thrust of PFT and others such as MLA) this can be greatly assisted by more open access to international markets as noted above, and this should continue to be a strong thrust of government policy.

At the same time, government can also have a role in assisting the building of the meat industry through pasture improvement, in part through support of relevant R&D and in part through removal of various impediments to that process as encountered by PFT and others. These are discussed in some detail in the section responding to the issues paper.

4. Impact of climate variability/potential climate change.

Again the major impact of this on our principal crops relates to profit margins. With tight margins, a simple late break will turn a marginally profitable crop into a loss-generating crop. Even worse, adverse weather at the finish will guarantee a major loss, given that most cost inputs have already occurred in the expectation of generating a reasonable return. A singular example in this regard relates to October the 12th 2004, when a combination of temperatures in the high 30's coupled with hot winds on dry soils wiped hundreds of millions of dollars off crop yields right across southern Australia in the space of a few hours. That loss turned what to that point were crops which were expected to give a reasonable return into crops which were in some extreme cases barely worth harvesting, and certainly did not cover the cost of production.

This impact of climate variability is significant for the future of farming systems as we see them for several reasons. Firstly, diversity of enterprise given by mixed farms also gives a degree of adverse weather proofing to farm income. Using the late break in many areas of southern and eastern Australia this year as an example, where an enterprise is heavily or solely reliant on cropping, a farmer has to grow a crop to generate cash flow, but sowing late is effectively gambling on a good finish to the season. If that doesn't happen, then he is most likely going to make a significant loss, even though cash flow is generated for the short term. If on the other hand, the farm is a mixed crop/pasture enterprise, then the gamble of late sowing can be offset against the high degree of certainty of deriving an income and cash flow from the animal side of the enterprise. The farmer also has the flexibility to reduce his crop area (and hence reduce his risk exposure) and to have a greater pasture area both to feed his animals and on which to conserve fodder if the spring does turn out to be favourable.

Even in the worst case scenario, where an ongoing drought means that significant feed must be bought in, with careful management, most animal enterprises can still return a profit. While many

farmers may not believe that, the existence of profitable corporate enterprises based entirely on lot feeding of animals prove that point. Put simply, a farmer cannot buy rain so that he can produce a crop, but he can buy in feed to produce an animal product. Another way of viewing it is that a farmer with an enterprise based on dryland cropping has no control over supply of the major raw material limiting his production (rain), while an animal producer has complete control over supply of his (feed). In the latter system, pasture or fodder grown on farm is simply a means of generating higher profit via utilisation of this cheaper feed source. That fodder may well include feed grain, screenings and other crop waste and residue; thus integration of enterprise provides additional complementarities.

As noted previously, the relevance of this to PFT is that as there is huge potential to increase the production of pastures/fodders per unit area (ie the cheapest feed form available for animal production) then pasture improvement can dramatically improve income from animal enterprises. At the same time we see an increasing need for mixed enterprises where crop and animal production can be used each to benefit the other in terms of rotation systems, risk management and income stabilisation and improvement.

Thus, increased use of mixed enterprises that incorporate improved pastures will give benefits to farmers of increased sustainability and profitability, while reducing the risk factors generally and particularly those associated with unpredictable climatic variation. We see this diversification as pivotal to managing those risks.

5. Market place demands; GM, product certification and environmentally friendly farming.

There is little doubt that Australia's much vaunted "Clean Green" image and factors such as product freedom from GM are good marketing tools in some markets. However, whether these marketing advantages translate into product price premiums that justify the input costs necessary to maintain the requirements for these labels is a moot point.

Again, many of the questions relating to these issues will be widely canvassed in other submissions, but we would like to highlight some specific viewpoints. In doing so, PFT would like to emphasise that it has no vested interest in GM, and does not expect to in the foreseeable future.

Firstly with respect to GM crops, it is our belief that Australia should accept that in the short to mid term future, many growers could be disadvantaged by lack of access to GM varieties and associated technologies. This is particularly so for producers of our major bulk commodities, which are increasingly being marketed simply on the basis of price. For example, the purchaser of feed grain will not pay a premium for GM free feed unless his market likewise demands that this product is not fed with GM grain. Most markets are not discerning in that regard and are not likely to become so, given that animal products that utilise GM organisms in their production system have been universally available for more than a decade.

Through our experience with and knowledge of plant breeding and genetics, we have no doubt that GM technology is among the safest new technologies developed over the last fifty years. All new technologies have associated risk, but in this case repeated and extensive scientific assessments indicate that the risk is minimal, and that fact is widely accepted within scientific circles. It is a tragedy that the technology has been hamstrung by what amounts to a fear of the unknown that has been widely exploited by various political lobby groups and individuals.

We also have no doubt that despite the fear created, GM will offer benefits in terms of lower production costs and better product quality in the short term, and many other advantages in the longer term. Accordingly, if Australian farmers are locked out from those advantages, then there needs to be offset returns to ensure they stay viable in the face of stiffer competition in the marketplace afforded by competitors with access to these technologies. This means finding markets for that produce which will pay significant premiums for GM free status. While we accept

that these markets exist, we do not believe that in general they warrant the additional cost to all producers required to maintain that GM free status across whole commodity groups. Where niche markets for GM free food do exist, we believe it should be the prerogative of individual producers to meet those markets as production of a value added product; the value adding being ensuring that the product achieves requirements for classification as GM free. The alternative of burdening the production systems for entire commodities with these requirements for the benefit of a few is not in our view good for the future of those industries.

In this, we believe that food labelling laws have robbed producers of an opportunity to value add to their product and to reap the associated benefits. If product were labelled as "certified GM free" for example, then producers of such certified GM free food would be entitled to receive a premium price according to what the market was prepared to pay. The alternative labelling of a product as "GM" will only have the effect of deterring buyers, forcing down prices and thereby penalising producers.

"Certified organic" produce stands as a case in point. Growers who are prepared to value add to their produce through adoption of the requirements to meet that label are rewarded, rather than the majority of growers being penalised through market resistance because they do not meet those requirements.

Adoption of this reward for effort type approach should be strongly encouraged by government, as this allows more producers to use their skills to effectively value add to their product before it leaves the farm. This additional return will help the entire rural sector by offering more production system alternatives and more value adding options, as well as increasing income and enhancing image of producers with their urban markets.

Farming in a genuinely environmentally friendly and sustainable way as opposed to a market perceived environmentally friendly and sustainable way are two different issues. In fact the two can be diametrically opposed, where particular systems of farming that some sections of the market place promote as more "environmentally friendly" can in some situations cause very significantly higher levels of environmental degradation than their "unfriendly" counterparts. Organic farming is promoted by particular groups as the most sustainable way of producing food. However, compared to their "non-organic" counterparts, on many if not most Australian soils these systems of farming will cause very much higher rates of soil structure degradation, nutrient depletion, salinisation and so on. Nevertheless while there can be dichotomy of market perception and actual fact, minimising environmental damage is vital for sustainability of agricultural production systems.

All farming has an environmental impact. However, extensive data show that in Australia's broad acre farming systems, this environmental impact can be minimised without any sacrifice of income through encouragement and adoption of better farming systems and management.

Using PFT variety and technology packages as an example, because Australian pastures generally have such poor production (as noted previously, this can average as low as 20% of rain limited potential) severe environmental damage is occurring as a direct result of low water use in these substandard pastures. Poor pasture or crop growth means low water use, and this leads to soil degradation through deep drainage, nutrient leaching losses, acidification and salinisation. By using PFT variety/technology packages, both water use and production are improved dramatically, with consequent declines in environmental impacts mentioned above. This not only adds to profitability derived directly from those pastures, but also improves soil quality and fertility indices, thereby also increasing profits for other enterprises used in rotation; in particular for cereal crops (refer Appendix 2).

We believe this stands as an excellent example of where improvement of production and minimisation of environmental impact can and do go hand in hand, and that increased sustainability of farming in all senses of the word is very achievable.

6. Business skills and knowledge improvement and adoption of new technology.

One of the major impediments to improvement of farm productivity and profitability stems from the low level of post-secondary education among farmers generally compared with both the urban community and our international competitors. While this is improving, there is still enormous room for further gain.

From our perspective as a product/service provider to the sector, low levels of education mean that the adoption of new technology or even the modification of existing technology to better achieve production/profit goals is being severely hampered.

Modern farming is highly challenging not only from a technical sense, but also from a business sense and will only become more so. If we are going to be able to meet these challenges, we need coal-face farmers who are not reduced to bemoaning that they would not be in farming if it weren't for the lifestyle. This statement is in our opinion at least partially indicative of farmers who need to be better equipped in the professional sense of understanding what they are doing and why. If they were so equipped, then they would have the ability to assess their enterprises and alternatives with the confidence to make decisions to achieve production and profit goals, to switch to new technologies or in the end to get out of the industry and apply their skills elsewhere. Without that knowledge and confidence, they are not able to recognise opportunities or problems in their production and business systems in time for action. These farmers are far more likely to need government assistance in hard times, and despite such assistance may still go broke. As such, these "lifestyle" farmers can end up being little different to "hobby" farmers; they are full time but still only survive through outside support.

We know that the product/service packages we have created in our business have the capacity to deliver huge benefits to farmers. However, every product/service company will tell farmers that and the ability of the farmer/business manager to determine which particular product or service will suit a particular farm business is increasingly vital for the survival of that business. Therefore we have a vested interest in ensuring that farmers are able to assess what we have to offer, and then to be able to make adequate use of that for their benefit and that of the entire sector. We do not want, and Australian agriculture does not need a level of education among farmers where it is easier to sell a tractor with a CD player for the lifestyle than it is a new technology for the farm business.

In this regard, government policy should expand the opportunities for farmers to access post secondary and vocational education, both through regionally based centres and systems of remote learning. Farmers should also be encouraged to undertake such courses, possibly including through use of tax breaks or other incentives, as if they can improve their productivity and business acumen, then the additional income created benefits not only the farmer, but both down-stream and service industries and indeed the entire economy.

Conclusions to this section.

There is unlikely to be any relief for Australian farmers from declining terms of trade in the short term, and even though input costs are not fully accounted, this is already causing very severe hardship among broad acre cropping industries in particular.

However, PFT does not believe that this situation cannot be remedied. Australian farmers are very resourceful and efficient by world standard; even if that is simply because they need to be to stay in business. While the upside potential to increase crop yields is limited, the capacity to reduce crop costs and increase yields through better rotations with improved pastures adds significantly to profit potential for both crop and pasture enterprises. We see realisation of this potential as vital to the maintenance of viable broad acre farming enterprises in many regions.

Australian rural industries generally are also at a disadvantage where they cannot value add and are restricted on export markets to production and sale of bulk, low value commodities. However, there are opportunities to value add and these can be expected to expand in the future as increased demand coupled with the opening up of international markets to the value added product gives new options for production and profit for Australian rural industries. Government policy settings need to encourage that development and to ensure that bulk marketing does not disadvantage value adding, as this is where rural industries as a whole stand to gain most.

In particular, the confluence of capacity to dramatically increase pasture and forage productivity with increased access to international meat markets offers very significant opportunities for animal industries in Australia. Government can significantly assist this industry development both by working to increase our access to those markets, and to foster programs that assist farmers to build their pasture productivity and animal production.

Climate variability and change do and will continue to strongly impact on broad acre farm enterprises in particular. This impact can be alleviated at least to some degree by enterprise diversification and the flexibility that offers, for example by use of high value animal production as a regular income across years and a cash flow source in poor years when cropping is high risk.

While the market is always right, the views of various market sectors on how produce should be grown or developed, its attributes etc. are not always matched by a willingness of the market as a whole to pay the additional costs associated with produce that meets those criteria. This is a particular problem where powerful lobby groups succeed in imposing production criteria that penalise producers of specific commodities as a whole. Instead, it is preferable to allow individuals or groups to use these demands as an opportunity to grow and supply a value added product that meets the particular criteria and to thereby attract a price premium that rewards their value adding activities. This approach also has the effect of ensuring that any such market demands are sufficiently strongly held that that market is willing to pay a fair price for the cost of that production, and is not merely making the demands in pursuit of some political agenda. Again government policy directions should promote this reward for market responsive, value adding approach.

Protection of the agricultural environment is vital for the long-term maintenance of a resource base that is sufficient to underwrite our capacity to farm. While urban myths and beliefs sometimes seek to drive farming systems in the wrong direction in this regard, achievement of the triple bottom line in our farming systems is quite achievable and is a major driving force behind new technologies, including those of PFT.

Lack of access and resultant low levels of post secondary education among farmers remain as a major impediment to long-term viability of many farm enterprises. Improved access to education relevant to agricultural industries, including farm and small enterprise business management can increase the rate of adoption of new technologies, improve farmer ability to farm in a viable and sustainable way and increase both profitability and international competitiveness. These benefits will flow through to the entire community.

Looking forward, many of both the inherent and emerging problems within our broad acre agricultural industries can be profitably and sustainably addressed through adoption of new technologies, diversification, the improvement of productivity, more value adding and better resource utilisation. In particular, the capacity to improve our pastures and thereby increase farm income and profitability across both animal and crop enterprises is huge, and this represents a significant and highly prospective opportunity for our broad acre agriculture. Assisted with appropriate policy settings, this generational shift to more balanced, sustainable, profitable, low risk farming systems will in our view underwrite a significant revival in our agricultural sector, as well as add billions of dollars to regional economies and our export income.

Appendix 1.

Profitability of an average Australian wheat crop

Farmers frequently rely on estimates of gross margins for various farm enterprises as published by state Departments of Agriculture or their equivalent.

However, these gross margin calculations mostly take little if any account of significant factors such as machinery costs (replacement, depreciation) yield averages (gross margins are often based on above average yields) or usual management practices. Furthermore, there is no direct nutrient budgeting to allow for net removal of nutrients with harvested grain (ie the difference between nutrients added with fertiliser and those taken off the farm in grain).

As a result, in most cases gross margins significantly over-estimate the likely income from various crop enterprises. This is confirmed by comparing ABARE statistical data with imputed data based on gross margin calculations and average areas of crop per farm. The latter gave forecasts of likely farm income that are more than double those indicated from ABARE data of actual total farm incomes. It should be noted however, that ABARE figures also take no account of nutrient exports, as these are effectively hidden costs.

In order to get some estimate of what the real picture is for an average farm before hidden nutrient costs were accounted for, PFT extracted data from ABARE figures to indicate average machinery depreciation costs. In addition, we sought to compare cost estimates from gross margin figures with actual whole farm costs recorded by ABARE as broken down into various categories.

We discovered that apart from depreciation costs being significant (~$30/cropped ha for an average farm), expenditure on fuel and on machinery repairs and maintenance in particular were also often under-estimated in gross margin analyses. We suspect that this is because these analyses are based on fewer tillage operations and machinery passes than actually occur on the average farm; that explaining both under-estimates.

Accordingly we re-calculated figures obtained from Primary Industries and Resources, SA Farm Gross Margin Guide for 2005 to allow for these additional costs and embedded them in three different levels of production of APW wheat on an average mid rainfall zone farm. For the three levels of production, we chose the PIRSA figure for this zone of 2.5t/ha, (which is on the high side of average) the approximate average figure for Australia of 2t/ha and 1.5t/ha to represent the low side.

Thus these three production figures can be taken to be indicative of both year by year and crop by crop (or farmer by farmer) variation of good, average and poor for this zone.

In deriving these figures, we also assumed that costs were independent of the good/average/poor division. This is certainly reasonable where variation in yield is caused by weather in the particular year because most of the input costs are incurred well before the farmer has any real idea of how the season is going to affect his yield. With respect to variation in crop yield due to other factors (eg management variations) this may not always be the case, as some poor yield may be due to lower inputs and therefore lower costs. Nevertheless, as all these adjustments are based on ABARE data of actual costs, and as the derived figures then give a good approximation of ABARE data for returns when broken down to a per hectare basis, we feel this assumption is moderately robust for both sides of average.

These recalculated figures are presented in Table 1 below, giving a resultant margin that we have termed the “nominal apparent profit”. This is effectively what the farmer can expect to have in his pocket at season end, but still does not account for net nutrient removal in harvested grain.

This net nutrient removal (particularly of N) is a hidden but nonetheless real cost of production, as the difference between what is added in fertiliser and what is removed with grain is derived from soil reserves. While these reserves can be run down for a time, a continuing reserve decline will lead to falling yields and rapidly declining profit margins. Hence these must eventually be replaced, and the cost of replacement should be debited against the return from that crop.

By comparing fertiliser additions with calculated nutrient removals, it can be shown that N is by far the most significant in cost terms. Accordingly, we calculated these N added/removed differences for the three crop yields and the consequent likely cost of N replacement. In doing so, we noted that adding N out of a bag does result in some losses, and therefore assumed an approximately 70% recovery rate for added N.

This figure is included in Table 1 (- *est N export replacement cost ($/ha)*).

Finally, we have observed that most farms are now relying on machinery that is fairly old, and in many cases is only being kept operational through the mechanical repairs and maintenance skills of the farmer. This cannot go on indefinitely, as increased breakdowns are likely to see falling yields through operations not being done in a timely fashion. Hence we have included a nominal amount of up to $20/ha to allow for depreciation on old machinery under-estimating that which would be expected on machinery if replacement occurred in a more timely and less risky manner.

The Real Profit figure for the three yields is thus derived after these additional but hidden costs are taken into account.

Table 1. Calculations of estimated returns on various yields of APW wheat

Mid rainfall zone farm	***Good crop or year***	***Avg crop or year***	***Poor crop or year***
Wheat yield (t/ha)	2.5	2.0	1.5
~ % of potential (French/Schultz)	85	70	50
Gross Margin ($/ha) (PIRSA)	180	110	40
- ABARE cost adjustment ($/ha)	-50	-50	-50
Nominal apparent profit ($/ha)	130	60	-10
- est. N export replacement cost ($/ha)	*-50*	*-40*	*-20*
(- machinery replacement cost est) ($/ha)	*(-20)*	*(-20)*	*(-20)*
Real profit ($/ha)	**60 to 80**	**0 to 20**	**-30 to -50**
Profit as ~ wheat equivalent (t/ha)	0.35 to 0.5	0 to 0.15	- 0.2 to - 0.3

The conclusion we draw is that despite the quite attractive figures presented in gross margin data, the real profitability on even a good crop is quite low when all costs are taken into account, and is at best marginal for the average crop/year/producer.

Appendix 2.

Using pasture improvement to increase crop profit margins.

Farms in the Australian wheat-sheep zone have traditionally relied on both wheat and sheep as major income sources, and various benefits have been derived from rotation of the two production systems across years in any one paddock. In this ("ley farming") system, legume based pastures give multiple benefits across the rotation. Firstly they provide good, high quality feed. Secondly the legume component fixes nitrogen which dramatically reduces requirement for expensive N fertiliser in the crop phase of the rotation. Thirdly, the legume pasture reduces disease carryover between cereal crops. Fourthly they provide an additional and very valuable tool for crop weed reduction and control; for example through grazing of herbicide resistant weeds, etc.

However, the amount of the vital legume component in most Australian ley pastures has declined significantly, and is very much below where it should be for maximum profit across the entire rotation. PFT has calculated for example that average ley pastures are only carrying about 20% of what would be expected if these pastures were performing up to their rain-limited potential. The major cause for this poor production is the lack of legume within those pastures, and thus increased legume content is a foundation to improved profitability of the entire rotation.

PFT has developed pasture legume varieties and technologies that make pasture improvement far more readily, reliably and cheaply achievable than ever before. PFT has also developed models to assess the impact these technologies and varieties will have on the average farm. In doing so, we have drawn on data from ABARE, gross margin data derived from Appendix 1 and our calculations of pasture production potential based on the French-Schultz formula for pasture production potential;

$$YP = (GSRF - 70\ mm) \times 45kg/ha$$

where YP = Yield Potential in kg/ha and GSRF = rainfall in the growing season in mm.

Calculations of sheep returns are based on pasture production, data relating to feeding requirements of various classes of sheep and gross margins sourced mainly from PIRSA and MLA. For general purposes, this can be summarised as indicating that a standard dry sheep equivalent (dse) grazing unit requires about 600kg of available paddock feed, with other sheep classes calculated accordingly (eg from MLA data contained in ProGraze® Workshop Notes).

We have based our analysis on an "average" mid rainfall, wheat-sheep zone, family farm with approximately 600 hectares cropped to wheat and 600 hectares of pasture running a self-replacing merino sheep flock. While this is obviously idealised, it is nevertheless indicative of how investment in improvement of pastures with a good legume can improve whole farm profitability.

Table 2 is thus a comparison of the "before and after" pasture improvement situation on that farm; with before being based on an average yield/production (from ABARE) for both wheat and sheep. Assumptions made with respect to the after situation are;

- pasture yield and carrying capacity increased to the same level of potential as for crops,
- crop yield increased by 10% from flow on effects of good legume pasture (extensive data show this increase or greater),
- no additional N requirement in crop (ie all derived from pasture legume N fixation),
- some increase in machinery, capital and operating costs from pasture improvement.

Note also that because of hidden (and unaccounted for) N balance changes for the average farm, actual *apparent* returns for this average farm are currently about $76 000 which is very close to figures recently forecast by ABARE.

Table 2. Calculations of achievable farm profit following pasture improvement.

Mid rainfall zone farm	***Pasture Current***	***Crop Current***	***Pasture New***	***Crop New***
Production/ha	2.5 dse	2.0 t	8.0 dse	2.2 t
~ % potential (French/Schultz)	20	70	70	75
Real profit ($/ha)	65	20*	175 [a]	100
Farm pasture returns ($/600 ha)	40 000		105 000	
Farm crop returns ($/600 ha)		12 000*		60 000
Estimated Net Farm ($/1200 ha)	***52 000***		***165 000***	

*Apparent figures (ie pre hidden cost deductions) for crop are $60/ha and $36 000/farm.

[a] Profit figures are based on use of PFT varieties and production technologies. Use of current varieties and technologies will reduce this figure by an estimated $50/ha due to lower production and higher legume pasture seed and establishment costs.