Intensive Chicken Meat Farming

"A Comparative Analysis

in the Reduction of

Industry's Environmental Footprint."

A report for

By Robert Kestel

Nuffield Scholar
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Foreword

After graduating from University of Queensland (Gatton campus) in 1984 and having been employed by processing companies both in Australia and in the United Kingdom I have dedicated myself for the last 14 years to managing our family farm.

I have seen a lot from both sides of the Meat Chicken equation and the area that I believe needed researching, from a farmers view point, were ways to lessen our environmental footprint. The main contentious issues that needed to be addressed in order to sustain viable farming enterprises on the rural urban interface were:

- Management of our used litter in an environmentally friendly way
- Reduction of farmers ever increasing input costs; and
- The Australian position on animal welfare and payment methodologies.

In March 2007, at forty five years of age, married with four children ranging in ages from seven to fourteen, the telephone rang, and a voice on the other end informed me that the Chicken Meat Industry have been invited to join the Nuffield Scholarship program, and would I consider applying for a scholarship.

The next and biggest challenge was to convince my wife Robyn that four months studying abroad was going to be beneficial for both of us.

The scholarship was to be sponsored by Rural Industries Research and Development Corporation chicken meat group.

Having travelled to Canada, Mexico, United States of America, Brazil, United Kingdom and the United Arab Emirates I now acknowledge that this Nuffield experience has been the most rewarding opportunity ever presented to me.

It has given me further confidence, to implement change towards positive outcomes for our industry. I have a real appreciation for the need to feed the population and for this to be done; farming systems must be kept both financially and environmentally sustainable.

Acknowledgments

My Nuffield experience has been a life changing one. For this I have many people to thank and recognize.

My wife Robyn and children Nichola, Brianna, Teniesha and Kade were the rock needed for me to experience the world. With out solid family support a Nuffield scholar would not be able to do travel or successfully research the subject.

My sponsors RIRDC chicken meat group. The Nuffield alumni, Jim Geltch, Ronald Thompson, Dave Alvis, Rodney Down, Ben Stanley, Mathew Davies, Mike Tyres, and Paul Kelly for the generosity and time afforded to Robyn and myself is very much appreciated.

To Dr Walter Bottje head of the Centre for Poultry Excellence at the University of Arkansas, Dr Sacit Bilgili and Dr Joe Hess from the Poultry Science Department of Auburn University in Alabama, Dr Mike Czarick and Brian Fairchild from Athens University in Georgia I thank you for sharing your knowledge with me.

I also would like to make a special thankyou to the following people and their organisations for allowing me the time to learn from their vast experience .

Gary Sansom CEO of ACGC. Dr Margaret McKenzie Ingham Enterprises. Dr Vivien Kite RIRDC. Dr Philip Moore USDA. Kevin Igli, Jamie Burr and Sarah Lilygren from Tyson Foods. Mike Walker, Roland Buchanan and Steve Butler. I also extend a very special thankyou to Dave Mooney from REM Engineering in Georgia USA.

Finally I thank Kerry Burnett for managing the farm in my absence and my business partners Bob and Dianne Kestel, and Dominic and Gino Lenzo for allowing me the time to further my knowledge in our industry and advance my personal development.

Abbreviation

RIRDC: Rural Industries Research and Development Corporation

USDA: United States Drug Administration

EMS: Environmental Management System

ACMF: Australian Chicken Meat Federation

ACGC: Australian Chicken Growers Council

Executive Summary

There is no doubt that the environment and meat chicken farming can co-exist with benefits for both. We, in Australia have the opportunity to learn from the mistakes other countries have made, and hopefully not repeat them.

Everywhere I travelled in the United States there was evidence of both environmental neglect and of animal welfare issues that needed attention.

These problems have historically been caused through poor management of used litter.

A lot of money is being spent on research and litigation in order to provide a way forward for responsible processors and farmers to reduce their environmental impact.

The situation in the UK is markedly different.

Intensive chicken farmers have less impact on their environment than anywhere else I visited. There are good reasons for this difference; American farmers are totally at the mercy of the processors.

In the USA, most of the farmers I visited farmed for wages only, with no means of investing in technology to reduce their environmental impact or address animal welfare issues.

On the other hand the UK has governmental assistance programs for farmers to adopt environmentally sound practises.

I have not seen anywhere else farmers more environmentally responsible and bio-security conscious than in the UK where they have obviously learnt from issues like mad cow and foot and mouth disease. Maybe we will learn from our equine influenza outbreak.

The blame for the financial predicament growers are facing squarely lies with the processing companies.

If processing companies allow farmers the return and the will to implement some of the findings of this report; the environmental and financial sustainability of meat chicken farming will be in a better position than it currently is.

Renewable energy generation could improve the environmental footprint more than any other strategy presented in this report.

Readers should know that the bio-char produced from energy generation is carbon negative unlike wind or solar power which is only carbon neutral.

There is no reason why chicken farming could not be the most environmentally sound system for feeding an ever increasing population.The input cost reduction strategies in this report are being practised around the world. Many of these strategies also aid in reducing the farmer's environmental footprint.

This is a "win win" situation. The financial means to look after the environment has to come from somewhere and ultimately this should be the consumer.

Animal welfare will come under increased scrutiny from activist groups. Australia is in a good position on this issue although compared to the countries I visited, our stocking densities and transportation of live birds during hot weather will need to be addressed.

The system for determining growing fees to be paid to growers by processors needs to be one that does not become a burden to the processing company.

This is achieved by using industry models to determine the price paid to growers, backed by a performance based incentive scheme. Most processing companies I visited were paying growers on live weight into the plant. The growing fee then paid on a fully costed pool system.

Needless to say I could expand on this report in many areas. In fact many of the issues raised could justify their own Nuffield research.

Introduction

This report is intended to give you an analysis of meat chicken farming, from a farmers viewpoint.

It is my intention to present to meat chicken farmers, ways of reducing their environmental footprint and at the same time suggest from field research, ways to reduce growers input costs and improve income.

I want this report to engage producers and trigger debate on issues that are of concern to farmers.Having experienced very good times for meat chicken farmers as an employee of Ingham Enterprises during the Eighties and early Nineties, I know what returns are required for farmers so that they can enjoy a life style that is linked to their investment and continue to reinvest in the latest technologies.

Retailer's desire for ever increasing profit margins comes at the expense of not only the processor but the farmer. It is because of farmers decreasing financial returns that we no longer see the traditional family farm being built. Corporate operations are the new investors in the industry, and time will tell if this was a smart way for the industry to move forward. I am yet to be convinced that it is.

We have this philosophy in Australia that what the Retailer wants they get. This philosophy is fine as the customer is always right, but not when it threatens the viability of an industry's ability to move forward with new innovative technology.

What the industry should be doing is to firstly become price makers and not price takers, this way processing companies can afford to pay their growers for the product that the consumer is demanding.

If the public expect to eat food grown in a certain way with double the input costs that there were ten years ago they have to be prepared to pay a fair price for it. Australian farmers need to stop subsidising the consumer. If this practise is to continue farming in Australia will be unsustainable.

If Australian meat chicken farms are going to be owned and managed by family farmers then processing companies need to ensure that grower's net returns are enough for families to reinvest in the industry and offer a realistic quality of life for the next generation.

Presently the majority of investment is coming from corporate bodies It is my opinion that these types of farms will only lead to smaller family operations having to accept even lower returns in order to keep growing chickens. Farmers will need to find ways of reducing on farm input costs and generate income from other farm activities. This is limited due to the Bio-Security ethos in complying with the Processors directive.

A good farn sign in Middle Swan WA

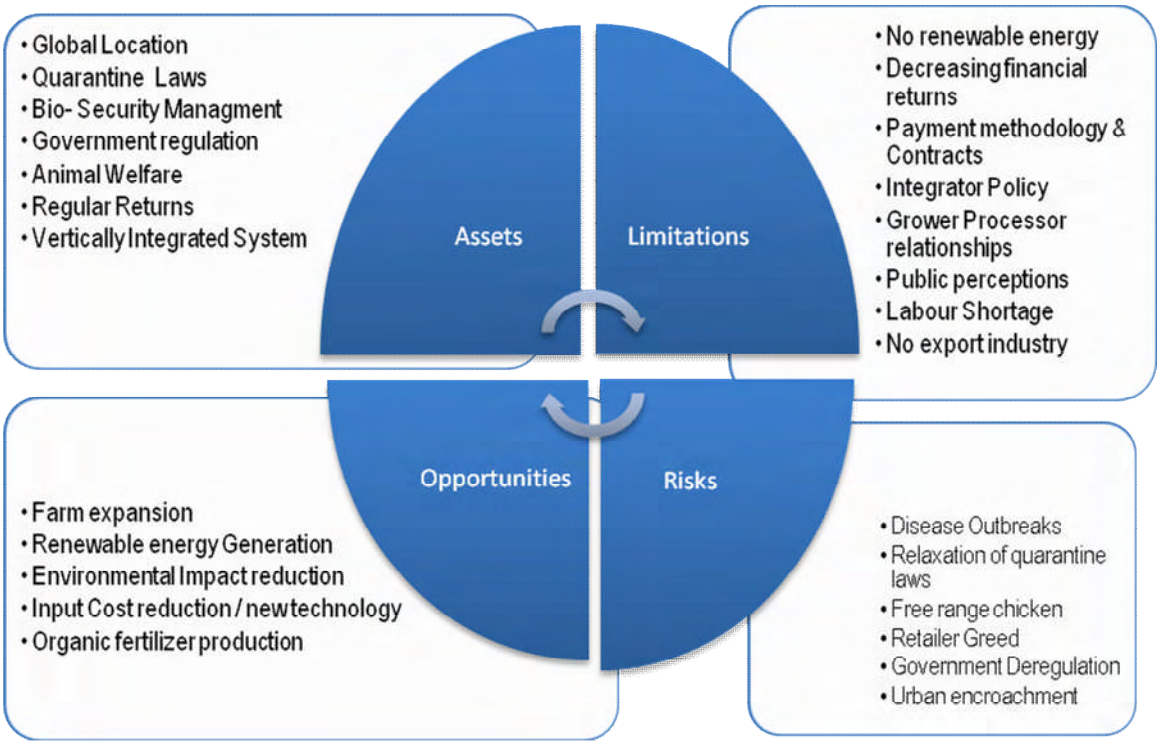
Objectives

This report is intended to present a comparative analysis of meat chicken farming. Information was gathered from field trips, research papers, anecdotal information and firsthand experience of farming.

I will present to meat chicken farmers ways of reducing their environmental footprint and at the same time present ways to reduce growers input costs and improve income. Undoubtedly, this report will trigger healthy and vigorous debate on issues that farmers are concerned about, mainly in the areas of housing, the environment and animal welfare.

The summary issues listed below will be more fully explored with specific emphasis on strategies to negate risks to industry and explore options for pushing the boundaries of our limitations, via the examples of our international counterparts, to benefit primary producers in this country.

Summary Issues



Australian Chicken Farming Asset Analysis

Global Location

Because of our global location we have a distinct advantage in keeping exotic diseases out of Australia.
Flight paths of risk migratory bird species tend to largely ‘pass us by’.

Quarantine laws
Due to quarantine restrictions on movements of live birds, eggs, and poultry products the only chicken meat coming into Australia is cooked and in cans.

Bio-security manual
Australian chicken meat farms follow the National Bio security Manual for contract meat chicken farming.

This manual was developed by the Australian Chicken Meat Federation and is recognised by Animal Health Australia.

The manual can be down loaded from the ACMF web site. Due to bio-security Australia has a generally favourable disease status.

National Environmental Management System

Production within the meat chicken industry in Australia has increased significantly over the past thirty years.

It is important that, with the significant growth of the industry, community environmental concerns, such as odour, dust, noise, and fugitive light control, are carefully managed.

Disease control and food safety are also major issues for the industry.

The advancement of the industry’s environmental performance is important thus RIRDC funded and facilitated a National Environmental Management System for meat chicken farming this was implemented via the ACGC Ltd.

The meat chicken EMS comprises of:

- Manual of Good Environmental Practise
- An example Environmental Management Plan
- Generic Environmental Plan
- An Environmental Risk Assessment Workbook
- Management tools upon which farmers can base their own specific farm plans

Government Regulation

Whilst operating under some sort of government regulation, continuity of supply and quality of chicken to the consumer has improved.

In most states the growing of meat chickens is still governed by an act and regulation albeit most states regulations are no longer actively enforced due to processor pressure.

Animal Welfare

During 2008 new industry National Animal Welfare Manuals were developed and trialled. These manuals will be run out across Australia during 2009.

The manuals are developed for hatcheries, growing and pickup.

Regular Returns

Meat chicken farmers in Australia are paid a growing fee per bird processed. These payments are generally made within one month of the birds being processed.

This provides for regular cash flow.

Vertically Integrated System

Meat chicken farmers are part of a vertically integrated system of which three companies produce about 80% of the chicken meat sold in Australia.

Ten other smaller companies supply most of the remainder. Currently 820 contract chicken farmers rear chickens for these thirteen processing companies.

Farmers can put their efforts into rearing chickens and do not have to be involved with Breeders, Hatcheries, and Feed mills, Processing or Sales.

Cobb World Headquarters Arkansas USA

Australian Chicken Farming Limitations Analysis

Decreasing Financial Returns

Over the last ten years Australian growers profit margins have steadily been decreasing, this is due to higher input costs and increased cost of new shedding.

At the same time bird numbers processed are constant but kilos of meat processed on some farms has increased by 30%.

Payment Methodology and Contracts

Australia is the only country that pays its contract growers by the bird. America, Canada, United Kingdom, Brazil, and Mexico all pay growers by weight.

Over the last ten years average live weights of birds have gone from 2.0kg to2.80kg with no extra payment for growing those extra kilos.

Processor Policy

Processing companies set policies on a number of different things to do with farming meat chickens. These policies are not always sound or have any scientific grounding.

The dogmatic approach by some processors on shed design and dimensions may impact adversely on grower's capacity to commit to expansion.

Little regard is given to the environment or growers' profit margins when farmers must adhere to policy that has been made without bi-partisan consultation.

Weakening Relationships between growers and processors

With processor attitudes toward growers continuing to be more of a dictatorship rather than partnership the relationship will deteriorate further.

Public perception

As is a common trend around the world the consumer wants to know more about the food that they eat. The current perception of meat chicken farming is somewhat different to the facts.

Meat chickens are not reared in cages. In fact, the environmental conditions in most Australian chicken sheds are better than anywhere in the world.

The majority of chicken consumers still believe that chickens are fed hormones and bombarded with antibiotics. Nothing could be further from the truth. The use of hormones has been banned in Australia since the nineteen sixties and use of antibiotics is determined by appropriately qualified professionals.

Labour Shortages

Due to the demise of the typical family farm and the fact that meat chicken farming is not a popular career path, labour shortages are an ongoing issue.

These shortages are exacerbated by farms having to be built further away from the metropolitan area than they have historically been.

No Export Industry

Currently a minimal amount of chicken products are exported from Australia thus chicken is only grown for the domestic market.

Australian Chicken Farming Opportunities Analysis

Expansion

With the current rates of urban expansion and older farms closing down this is presenting expansion opportunities for growers that have the land, water and capital.

The current world economic situation may influence the uptake of expansion offers at the moment.

Input Cost Reduction and new technologies

With the now accepted way of growing chickens in controlled environment housing, the cost of growing chickens has increased to levels never seen before.

In order for farmers to stay profitable they must reduce running costs. This can be achieved by implementing latest technologies.

- Heat exchangers
- Drop Ceilings
- Ceiling Vents
- Re-use of litter
- Innovative bedding material
- On farm heat generation

See appendices for more information on the above dot points.

Renewable Energy Generation

Latest technology known as pyrolysis can now convert raw chicken manure into gas, steam, electricity and bio-char. Growers should be able to now turn their by-product into an income.

Environmental Impact Reduction

For chicken farms to continue to be located at the urban rural interface they must adopt practises to reduce their environmental impact. Issues such as waste disposal, odour, dust and ammonia emissions can now be addressed.

- Tree Buffers
- Wet Scrubbers
- Exhaust air treatment rooms
- Dust collection drains
- Earth Bunding

Organic Fertiliser Production

Work is currently being carried out using a microbial digestion process turning chicken litter into organic fertiliser and a soil remediation product.

Australian Chicken Farming Risk Analysis

Relaxation of Quarantine Laws

With free trade agreements being signed by governments and pressure being put on our quarantine laws by countries pushing the compartmentalisation barrow, the Australian meat chicken farmer continues to be at risk.

If our countries quarantine laws were relaxed in any way that would enable chicken meat to be imported, the financial viability of chicken farms would be unsustainable.

Whilst this is not a reason that the WTO would accept, it prevails in Canada. There is every possibility that the current suppliers of chicken into the retail market would import their chicken instead of having it grown locally.

Free Range Chicken

As the consumer wants to be more in touch with what they eat and where it comes from it is my belief that they are ill-informed about the facts about free range chicken production.

I maintain that the production of free range chicken is not worth the risk that it presents to the more traditional meat chicken farmer.

Bio-security, food safety and animal welfare issues are not the same for both types of farming.

Traditional chicken sheds are fully cleaned and disinfected at the end of every batch, free range sheds are not, birds have access to eat dirt and dropping contamination from previous flocks thus increasing the risk of salmonella and campylobacter contamination.

Differences between free range and traditional farming (Table)

Differences between Free Range and Traditional Farming		
	Traditional	**Free range**
Wild bird proof	yes	No
Total depopulation	yes	No
Wash and fumigation	yes	No
Rodent access	restricted	No restriction on range
Predators	No access	Access
Water and feed accessibility	Very good	Limited feed or water on the range

Disease Outbreaks

Importation of chicken meat and downgraded bio-security to accommodate free range chicken increase the likelihood of a disease outbreak. The greatest threat for outbreak of disease comes from poor bio-security.

Retailer Greed

The desire for retailers to generate greater and greater profits comes at the expense of the farmer.

If processors and retailers keep putting downward pressure on grower returns then it will not be financially sustainable for growers to invest in the latest shedding and technology.

Government Deregulation

If this was to happen growers would not have any security on what the processors may pay as a growing fee. This was the reason for the introduction of regulations in the first place.

Urban Encroachment

Along with a lot of other types of farming, chicken farming is being threatened by urban encroachment. The chicken meat farmers need to be part of the decision making process to ensure their right to farm is not being eroded.

Dr Walter Bottje head of poultry science Arkansas University

Comparative Outcomes Applicable to Australian Model

Strategies that can be applied to identified Limitations and as such converted into Australian Industry Opportunities

Expansion

Many processors are offering expansion opportunities at the present. It is my recommendation to growers to pool their resources and build state of the art facilities that offer economies of scale not seen on the traditional smaller farm. This can be achieved by implementing the following steps.

- Appoint a steering committee
- Carry out a feasibility study
- Issue a prospectus
- Offer shares to existing growers
- Appoint a board of directors
- Raise extra finance needed
- Secure long term contract with a processor
- Appoint C.E.O and manager

It is my belief that this is the way forward for existing chicken farmers. They do not have to over capitalise their own farms that may have limited life and they only have to invest a small amount of capital to have a long term future in the industry. Ultimately growers could all be share holders in one company that rear all the chickens for a number of processors.

Input cost reduction and new technology

Heat exchange unit

Due to increasing energy costs American and British chicken farmers have to implement ways to reduce these costs .The Agro Clima Unit can be fitted to new or existing housing. This unit was developed for use in intensive livestock systems where fresh air can be introduced without compromising heating costs The principal is based on the transfer of heat from within the house to the incoming air via a heat exchanger unit that can be placed either within the house or outside the building. The air is distributed evenly throughout the house. The unit can vary the amount of air from 0-0.7m3/kg/hour.

Ceiling or Attic Inlets and Dropped Ceilings

Before adopting these strategy growers would have to convince the processing company of the benefits of dropped ceilings: 10% to 15% lower heating costs and 10% to 15% lower electricity costs. Not all processing companies allow growers to build sheds with dropped ceilings. You cannot make use of attic inlets without dropped ceilings; American farmers with attic inlets are reducing their heating costs by a further 5% to 20%.

Re-use of Litter

The practise of re-using litter is not new however with increasing bedding material costs, growers are being forced to look at this practise. Litter must be free of pathogens before being re-used. This is achieved by composting, either in house or externally. A better result is achieved when composting takes place external of the house as it allows for a more thorough cleaning and disinfecting process.

Innovative Bedding Material

Pulverised wood pallets and packing crates are now being used as bedding material. This product is an economically and environmentally viable alternative to hardwood sawdust. The sawdust is increasingly becoming more difficult to source. This is only being used in Western Australia and has won an environmental award for recycling.

Sand as bedding material

Agricultural Lime Sand from the Lancelin area of Western Australia has been trialled as a bedding material .This bedding material is cost neutral as the finished product is in high demand throughout the wheat belt region of Western Australia due to its neautralizing and fertilizing effect..

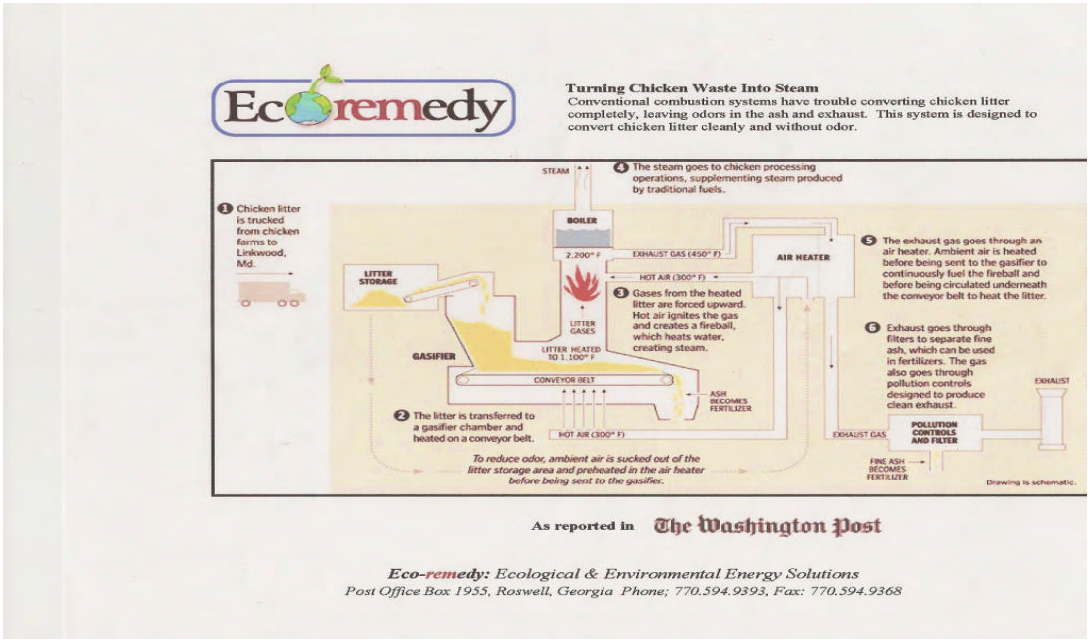
Pulverised Wood Heating System.

This system pulls air from inside the house, it then passes through an exchanger and is then circulated back into the house.

- This system is only in the prototype stage
- Showing significant reduction in propane usage
- Will take more work than a straight propane system
- Probably 6 months before being ready in the US

Renewable energy

The latest technology to convert poultry litter into syngas, steam, electricity and bio-char is now available. The process is called pyrolysis or gasification. Alternatives to land application of litter are being sought as this practise in some states of some countries is being banned. Gasification of litter offers an economical and environmentally friendly solution to this challenge.



Pyrolysis plant diagram visited Georgia USA

Organic Fertiliser and soil remediation

Using conditioned poultry litter to feed an aerobic bio-digester Gary Nunn from Western Australia has developed a liquid product known as Mikom. It is a powerful anti-oxidant, with a redox potential of -500Mv and an alkalinity rating relevant to CaCO3 of 12100.Mikom is currently being trialled in soil remediation as it has potential to lock up heavy metals in soil and solution.

In all studies so far Mikom has proven to be non pathogenic and harmless for both humans and environmental exposure. A pilot bio-digester is currently operating on a poultry farm in Gingin Western Australia.

Mikom is also being trialled in the horticultural industry as an organic liquid fertiliser, the solid by-product from the digestion process is being used as a soil conditioner and potting mix.

This process offers growers environmentally friendly methods of disposing of poultry litter and at the same time generate further income.

Strategies that can be applied to identified risks and converted into Australian Industry Assets.

Decreasing financial returns

- Growers should adopt practises to reduce input costs and be part of cohesive grower groups to keep pressure on processors to pay gazetted growing fees.

Payment methodology and contracts

- The current methods for determining grower payments vary across Australia. Industry research needs to be carried out to determine the most sustainable method for price determination.
- Across the counties that I visited growers were paid on a fully costed pool, this way no one grower will cost the processor any more money than the average of the pool.
- Contracts need to be simplified and reflect the level and term of investment.

Processor policy

- Policy that has a direct impact on growers should always be developed in consultation with growers. The knowledge and experience of growers is often overlooked.

Grower processor relationships

- Both growers and processors need to adopt a positive attitude toward the each other, lines of communication must always be kept open.
- Growers and processors alike need to appreciate and nurture this symbiotic relationship.

Public Perception

- Through industry groups such as the ACMF educational campaigns should be developed and implemented .Topics such as husbandry, animal welfare, housing, Australia's disease status and processing could be part of this educational program.
- Growers must on all occasions demonstrate a clean and professional image.

Labour Shortages

- Secondary and tertiary courses within our education system will help this growing problem.
- Change the image of poultry farmers.
- Promote the lifestyle benefits of farming.

No export industry

- Joint government and industry feasibility study into developing an export industry. After all, the hundreds of millions of people to our north are going to need to be fed.

Strategies to address Risks

Relaxation of quarantine laws

- Keep pressure on government not to allow imports in. Not just in the area of disease risk but also because the financial viability of our own farmers would become unsustainable.
- Learn from Canada, their government puts their own farmers first.
- Farmers need to lobby government as farmers not processors.

Disease outbreaks

- Make bio-security standards the same and mandatory across all forms of chicken rearing.
- Keep chicken meat imports out of Australia.

Free range chicken

- Mandatory bio-security between free range farms.
- Separate catchers and equipment for free range and intensive farms.
- Until dot point two can be implemented, all intensive farms to be day old chicks placed first and birds for processing picked up first.

Recommendations

- Protect your investment
- Be proactive when dealing with environmental issues
- Foster innovation that will increase profits
- Understand the profit implications when expending capital
- Adopt all Food Safety, Bio Security and Animal welfare directives
- Make building better relationships with processors a priority
- Become more professional farmers
- Get involved with the politics of your industry. Do not leave it all to the processors. They just may have a different agenda to you.

References

- Sand as Litter for Rearing Broiler Chickens: S.F. Bilgili and J B Hess Auburn University
- Heat exchange units: Mike Tyers from Agro Supply
- Attic Inlets and Drop Ceilings: Michael Czarick: University of Georgia
- Re-use of Litter and in House Composting: S.FBilgili and J B Hess Auburn University
- Pulverized Wood Heating System: Michael Czarick: University of Georgia
- Pyrolysis: Eco- remedy www.eco-remedy.com

Appendices

Appendices' are available at www.nuffieldinternational.org/append.html

Plain English Compendium Summary

Project Title:	**A Comparative Analysis in the Reduction of Industry's Environmental Footprint**
Nuffield Australia Project No.:0802	
Scholar:	Robert Kestel
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Objectives	To investigate environmentally friendly solutions to managing spent broiler litter. To report on ways for farmers to reduce their environmental footprint and input costs.
Background	The requirement for poultry housing to be tunnel ventilated has lead to greater input costs and a larger environmental footprint. The environmental issues with tunnel ventilation are that all of the emissions from the house are in a concentrated form at one end of the house and more energy is used controlling the environment within the house.
Research	The research was conducted over a ten month period starting in February 2008 The study took me to America, Mexico, Canada, Brazil, UK and the UAE. Considerable time was spent at the Department of Poultry Science, Auburn University Alabama. Centre of Excellence for Poultry Science, University of Arkansas and the Poultry Science and Engineering Departments, Athens University Georgia.
Outcomes	With ever increasing financial and environmental pressure put on meat chicken farmers the economics of growing chickens has to improve. Only when this happens will farmers have the financial means to implement practises to reduce their environmental footprint. Processing companies will need to contribute financially to enable growers to adopt new technology to both address environmental and financial problems the industry is experiencing. The upside of all this is that meat chicken farms will become environmentally responsible and become a more attractive career option. This will in turn keep our industry vibrant.
Implications	Due to retailer pressure on pricing processing companies are now having to grow higher yielding chickens. This higher meat yielding chicken requires housing in controlled environment shedding.

Unless processing companies turn the genetic clock back 15 years growers must embrace the new direction of growing chickens. Farmers will need to be educated and technologically advanced to change their terms of trade. If farmers manage to do this growing meat chickens will be a very sustainable industry.

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