

Australian Nuffield Farming Scholars Association



2002 SCHOLARSHIP

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Topic:

The study of cows in freestall barns and
the management for feeding and health issues

Sponsored By:
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Executive Summary

Through my Nuffield experience I looked at a variety of things and found a number of very interesting outcomes, these included:

- Better ways to treat lameness in dairy cattle, being easier and cheaper by up to 50%
- Ways to increase tons of dry matter per hectare utilised
- Better ways to synchronise cows for breeding compared to how we do it now as well as being a saving of about 50% and the possibility of achieving a 75% heifer to bull calf ratio
- Ways to increase milk production per cow via different styles of management
- Different ways of handling effluent and different uses for recycled effluent
- Niche markets for milk where a farmer was getting \$65 US per 100 pounds of milk compared to the average farmer who was getting in the range of \$9 -\$17 US per 100 pounds of milk

All in all it was an incredible journey that I will never stop learning from, as long as there are cows to be milked there will be something new to learn.

Acknowledgments

Being awarded the 2002 Nuffield Farming association scholarship was certainly an honour which has put a global network of industry contacts and information at my finger tips for which I am truly grateful and from this I would like to acknowledge a number of people.

I would like to thank the Australian Nuffield Farming Association for showing faith in me and awarding me the scholarship.

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I would also like to thank Judy my partner for looking after things while I was away overseas, without Judy's help I would not have been able to undertake the scholarship.

Aims\Objectives\Study Goals

The Aim of my study was to study cows in freestall barns in an intensive environment, the management issues involved with large herds and the cut and carry methods used to feed them.

Introduction

With my study topic in mind I endeavoured to look at many different issues associated with housed cows and the feeding techniques used, these topics covered a variety of things from reproduction, disease and health management, quality assurance to marketing of the end product just to name a few.

Reproductive Management

One of the first areas I looked at was reproductive management and replacement stock. This is a topic that effects every farmer no matter what size herd they have, the difference being the larger the herd size the more management that was needed. There were a couple different areas I looked at.

First was heat synchronization and the actual getting of the cows in calf. In Australia the most common practice for synchronizing of cows is the use of a device called a CIDR. In the USA this particular product isn't registered for use in lactating dairy cows so they have had to come up with a different method, which is called the OVSYNCH program. Both programs end up with the same general result but are administered very different.

With the CIDR program used in Australia it is an implant and a series of injections followed by heat detection and insemination, which can be a messy and complicated process.

With the OVSYNCH program it consists of a series of injections to the cow over exactly the same time frame as the CIDR program, (it doesn't involve a device to be implanted into the cow which can introduce infection into the reproductive tract of the cow), it also doesn't involve heat detection of the cow and on day 11 of the program the cow is inseminated regardless of showing signs of a standing heat or not, whereas with the CIDR program a standing heat needs to be observed before joining. What the OVSYNCH program eliminates is the risk of missed heats from human error, it reduces the risk of infection from no device being inserted into the reproductive tract, it makes for a more employee friendly system where the human error factor is removed with no heat detection being required. Another major benefit of the program is that the cost is significantly less than the CIDR program.

When comparing the 2 systems for conception rates they are about on a par although recent research has shown of the cows in calf to the OVSYNCH program, 75% of calves on the ground are heifer calves, whereas with the CIDR program its more a 50-50 ratio of heifer and bull calves.

Another advantage of the OVSYNCH program over the CIDR program is being able to be very aggressive when preg testing. With both programs preg testing can be done at about 35 days, with the OVSYNCH program however 7 days prior to preg testing the cow can be injected with the first stage of the treatment again, just in case the cow hasn't conceived and a follow up heat wasn't detected (if the cow is actually in calf the injection doesn't effect the pregnancy). If the cow is preg tested not in calf she can then be given the second injection the same day as the negative preg test and inseminated 3 days later. If using the CIDR program the cow can't be joined for another 10 days. What this means is it gains a week in getting the cow back in calf which can make a huge difference in a herd that require a tight calving pattern.

Lameness

Another area I looked at was lameness issues associated with cows in freestall style applications. The causes of lameness can be different in freestall barns compared to conventional pasture based farming with the types of injuries and conditions also varying. Another big factor that can be a major cause of lameness in housed cattle can be loafing area design and over crowding. If there isn't sufficient room for lying down then the cows will stand around thus causing the cows to go lame. Studies in the USA have found that cows need to be able to lie down for at least 14 hours per day, so barn design and layout is a critical factor.

Because the cows aren't walking about as much as cows on pasture, their feet don't wear as much which then requires regular trimming of the hoof, a standard trimming program would be when the cow was dried off at end of lactation she would have her feet trimmed then again at say 100 days in milk after calving, this type of maintenance if done correctly will reduce the cases of lameness throughout the herd. It has also been shown in studies that the trimming of hooves on maiden heifers prior to their first calf and ensuring hoof angle is correct can increase milk production up to 1900 litres per lactation because the risk of going lame has been greatly reduced.

This leads into another aspect of lameness I looked at which is the treatment of various conditions and tools used to do this. One of the different tools used that really stood out was a tipping crush, this restrains the cow like a normal cattle crush but also lays the cow on her side so that access to all 4 feet is easy and at a good working height, once on their side the cows don't seem to struggle and resist as much they would in a normal standing crush which reduces the chance of injury both to the cow and the person trimming.



A cow in a tipping crush ready to be worked on

Once the cow is suitably restrained comes the part of trimming the feet. Here in Australia the standard tools being used are hoof knives, rasps with some trimmers using electric grinders with abrasive discs, what I observed in the states was pretty much the same except for the use of an electric grinder being the first choice of tool used with a specialist hoof trimming disc instead of a standard abrasive disc. This different style of trimming disc enables the trimmer to reduce the time required to trim, being a far more aggressive disc, heat caused by the disc is greatly reduced with a specialist disc which is of huge benefit to the cow. Some examples of different styles of trimming disc and the use of a grinder are as below.



The use of a grinder with a specialist trimming disc to trim and prepare the hoof to be treated, you can note how well the specialist disc prepares the surface for gluing.

A range of different style hoof trimming discs ranging from pressed cutting edges to replaceable carbide cutting tips



One particular tool used for the trimming and treatment of hooves was a different type of two-part epoxy used to glue a prosthetic shoe to the hoof. The traditional style of epoxy used here in Australia has been a powder and liquid type that was very messy and time consuming to mix, the hoof trimmer I spent time with was using a different type of product called BOVI BOND which is a 2 part epoxy that comes in a large tube (very similar to araldite) and applied with a special application gun and static mixing tip with the result being the correct amount of glue being mixed without waste and mess. It also reduces the risk of glue coming into contact with human skin. (See picture below)



Note the ease at which the epoxy is mixed and applied compared to traditional methods

Another advantage of this particular style of epoxy for the treatment of lameness is its cost effectiveness, costs of fitting a hoof prosthesis can be reduced by up to 50% with the added convenience of less mess and wastage.

Disease Control And Bio Security

This particular topic is very important and can be a huge issue where large numbers of cattle are kept in a confined area such as a freestall barn. A couple of the diseases I looked at were Mastitis and Bovine Johnes which are very relevant to Australian dairy farmers.

In relation to the mastitis issues, when the numbers of cows increase the amount of manure increases which can be one of the greatest factors in increasing the risk of mastitis, especially environmental mastitis which is a huge financial burden to the industry. So when large numbers of cows are involved, management practices have to be spot on. One of the main things I observed in the control of mastitis was the herd health management. It was encouraged by vets that the farmers took milk samples of every cow when she calved and to get that sample cultured to identify if there were any organisms in the milk that could cause mastitis and elevated BMCC (bulk milk cell count).

In the USA they have an organism called myco plasma that we don't have here in Australia or should I say don't test for, that can cause a very high somatic cell count in the cow which cannot be treated yet is very contagious to other cows and calves and left unchecked and poorly managed can cost the farmer a huge amount of money. So with this particular organism, fresh cow management is critical. If the cow is identified as having myco plasma then at the very least she should be kept separate to any un-infected cows and the milk from these cows not fed to calves.

The best solution being to cull the cow and send her to market, getting her off property. Because myco plasma was so common on some farms it wasn't always the best option to sell off a large percentage of the herd so the management strategy was to keep these cows in a separate group and milk last so as not to infect clean cows, with the long term strategy being to sell off as many as possible with the result being a clean herd after a few years.

Others ways of combating the spread of myco plasma was the correct training of milking staff so as not to spread the disease in the milking parlour. Correct teat preparation before cups on and correct teat dipping/spraying after cups off was also critical to the spread of not only myco plasma but all mastitis causing organisms.

Another management technique I observed to combat new infections was the singeing off of excess hair on the cows udder around the teats. This was effective in a number of ways from keeping the udder cleaner reducing environmental mastitis, it also enabled better teat dipping and spraying of udders after cups off and it was also used as a first defence against the spread of bovine johnes disease to new born calves. The bovine johnes disease lives in contaminated manure and if a freshly calved cow lays in manure and then the calf suckles her, the risk of the calf coming into contact with contaminated manure on long udder hair is reduced.

Another part of disease risk and spread I looked at was from farm to farm and how easy it was to spread disease to another farm.

I visited a university in California called UC Davis and spoke at length with one of the professors that had studied this particular issue with some alarming results being found. It had been observed that if a person was to walk in contaminated cow manure and then to walk across a field there would still be traces of contamination found up to 300 meters away from the original contamination source, which only showed how easy it was to spread disease from farm to farm by careless cleanliness and poor bio security practices. It clearly pointed out to me the need for protocols for visitors coming onto farms especially those that have been in contact with other farms, i.e. vets, consultants and artificial breeding technicians just to name a few.

In Canada there was a policy on a lot of farms that new boot/shoe covers had to be put on before entry was allowed into a facility. In the USA I visited a milking factory where visitors had to walk through foot baths and to wash their hands before entering the factory and even once inside the factory going from section to section had to walk through more foot baths and wash hands as well as putting on shoe covers.

I feel this is one thing that as an industry in Australia we seriously have to look at if we are to be a real player in the world export market where our customers look at quality and the procedures and protocols we have in place to ensure we deliver a quality product.

I also feel it is something we need to address on farm, the risk of spreading disease from farm to farm for our own economical benefit.

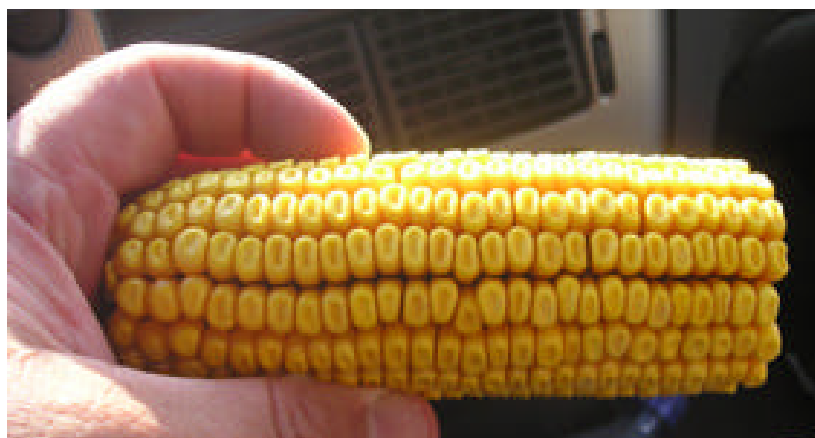
Cropping And Fodder Conservation

One of the most important aspects of the housed cow scenario is the feeding of the cattle. Because in this environment the numbers of cows makes it unviable to graze under traditional Australian farming style, the idea of cut and carry comes into place. What this term means is to bring the feed to the cows rather than walking them to it. Large numbers of cows require many tonnes of feed to be stored so crop choice needs careful thought. The requirement to grow more tonnes of dry matter per hectare really becomes important and instead of growing around 7 – 10 tonnes of useable dry matter, figures pushing up to 40 tonnes of dry matter per hectare can be achieved through correct crop selection and management.

An example might be two fast growing crops of corn yielding up to 14 tonnes of dry matter per crop and say a crop of wheat or triticale harvested at the boot stage and put into silage may yield a further 10 tonnes of dry matter getting your total yield per hectare up to 4 times the average yield under traditional farming practices here in Australia. Once these crops are harvested, the process of ensiling becomes very important and correct management of the ensiling process can make a huge difference on fodder quality with mega joules of energy per kg of feed having a huge impact on litres of milk produced.

While overseas I observed a fair bit of corn being harvested and ensiled and noticed different stages of maturity compared to when we harvest corn here, in the USA the corn was harvested earlier than we do here giving it a lower NDF value and being more digestible. They also had the added advantage of not being restricted in the use of GM crops so the end result being a far superior feed being presented to the cows compared to what we do here. The following pictures are examples of corn maturity and crops I observed in the USA.

Showing cob maturity



Building a silage stack



Chop length of the corn silage

Harvesting of corn



Housing of Cows

I guess the main purpose of my scholarship was to look at how the cows were actually housed. In my travels I looked at many different styles of housing, from the very basic to the very elaborate with herd sizes ranging from 30 cows to 10000 cow installations. In the more basic operations the cows were kept in more of a feedlot style set up with only basic shedding which allowed the cows to get out of the elements (see photo).



Example of feedlot style pens

Example of feedlot style pens with basic feed alley

These set ups were prone to a lot of mud in winter months with the added risk of increased somatic cell counts from environmental mastitis. Cow comfort also seemed to be sacrificed to a degree.



The main style of housing I looked at was the freestall style barn where every cow had her own place to lie down, and generally the cattle were under cover every day of the year.

Shed design was critical to ensure cow comfort and to reduce the risk of over crowding which could lead to the risk of disease outbreak and sick cows, not to mention lost production.

Some of the factors that needed to be taken into consideration were:

1. Ventilation – this is one of the major issues with housed cows and cow comfort for heat stressed cows can get sick very easily and milk production is decreased, hence the design of the shed so as to have large air flow was critical. This can be achieved through a number of ways, the slope of the shed roof and an air gap at the top of the roof to enable hot air to draw up and out of the shed, there is a formula using the height and length of the roof which determines how wide the gap at the top needs to be to ensure maximum air draw. Another factor that needs to be addressed is the height of the roof, too low can cause over heating and at the other extreme too high can make the shed too cold at certain times of year. Other ways to help cows keep cool include the use of sprinklers and fans.



2. Loafing areas – this is another critical issue when the design of a shed is being considered, if cows don't have sufficient space to lie down they stand for extended periods which increases the risk of lameness (a cow needs to lie down for about 14 hrs per day). Loafing areas can either be the single stall style (as seen in previous picture) or large sand or sawdust pads where large numbers of cows can lay down in a group. The main style of loafing area I looked at was like in picture above. Once the style of loafing area is decided on the type of bedding is the next thing to consider. A lot of the individual stalls I looked at had dried manure recycled as bedding, this sounds like it would



cause disease but it didn't as long as the manure was dry enough. Another type of bedding that was very popular was sand which was very comfortable for the cows to lie in as well as having a very low risk of disease. Other styles of bedding included rubber, sawdust or wood shavings and for the up market cow I even looked at individual water bed style mattresses for each cow. Bedding needed to be tended to weekly also, either by topping up of the material or running of a rake to break up lumps and hard crust, it only makes sense to ensure the bedding is correct because ourselves as humans don't like an uncomfortable bed to lie in and cows are no different.

- Effluent disposal – another critical consideration when designing a shed, for when there are many cows there is a lot of manure accumulation and if not kept clean the risk of disease increased substantially. Most of the installations I looked at had automated flood wash systems that would wash the alleys every so many hours with large separators and effluent ponds being built to remove solids from liquids.



Examples of separators being used.

Piles of solids extracted via a separator

Example of manure separator used



- Feeding – where to feed the cows was another factor to consider with most installations having feed alleys in place where a tractor and feed wagon could drive through to feed the cows, see pictures below.



Feed alley



Feeding cows, enough room needs to be allowed for safe access

Niche Markets

One area I will briefly touch on that I hadn't originally planned to look at while travelling is niche markets.

Whilst on the core tour it was recommended if I had time to go and look at a unique dairy in California that was producing organic milk totally different to traditional dairy farming. The thing that was unique about this particular operation was, instead of bringing the cows to the dairy twice or 3 times a day to be milked, this guy took the dairy to the cows, and the way he did this was by having a portable dairy set up on the back of a semi trailer and a portable vat on a tandem trailer and then he would tow the trailers to a group of paddocks the cows were grazing in and set up portable yards.

His reasoning for doing this is it give him a clean green image to have cows out in the paddock grazing plus he didn't need large areas of concrete and capitol investment to hold them on, hence not getting large build ups of effluent he had to manage because it all stayed in the paddock where ever he parked the trailer. Then came the next interesting part of the operation, the way he marketed his milk and value added every drop. He had a small bottling plant set up where he bottled his own milk, he also produced organic cream and butter, but the most innovative thing he was doing in my eyes was selling bottled colostrum from freshly calved cows (this guy considered all milk from day 6 to day 20 colostrum), a 500ml bottle was selling for about \$12 US. All in all he was making on average \$65 US per 100 pounds of milk where the average US dairy farmer was getting between \$9 - \$17 US depending on the grade of milk and the time of year. As you can clearly see this guy with the organic dairy was certainly value adding and marketing his product to get an incredible return. The following pictures help to give an idea of the operation and how it was set up.



Mobile dairy with portable yards, note the absence of concrete



Portable vat unit that was towed back to the bottling factory approx 1km away



An old shed site, note how you can barely see there was once a dairy there with the regrowth of grass



The portable dairy, certainly a very compact and portable set up.

Conclusion

Are freestall barns the way Australian dairy farming will go in the future?

This is a very hard question to answer, I don't think every farm will build a freestall installation in the future although I think that for farms to be able to increase herd sizes so that we can compete on a global market place a variation needs to be developed where cows are housed for part of their lactation as well with the ability to access pasture to achieve a happy medium between both styles of farming.

With the ever increasing pressure to reduce costs to produce milk, one of the only ways to do that is to increase milk production per cow, putting cows into a housed environment such as a freestall barn where the cow isn't burning up energy walking to and from paddocks twice or three times a day, the food is placed in front of her so all she needs to do is maintain body condition, produce milk and get back in calf. Once a management system is in place that increases litres per cows, then more cows can be added to the system without compromising production or cow health thus giving better return on capital spent on dairies and machinery etc.

This also reduces the need for capital expenditure in the form of fencing, water, shelter breaks and laneways and the constant upkeep of these items.

It also increases tons of dry matter per hectare through cows not trampling down potential feed (large numbers of cows trample a lot of grass when they walk into a paddock).

So bring on the future and lets see what happens, my prediction is you will see a lot of freestall style operations appearing over the next 5 – 10 years.