AUSTRALIAN NUFFIELD FARMING SCHOLARS ASSOCIATION

# REPORT OF VISIT TO THE UNITED KINGDOM

By Edgar C. Hawter
(Western Australian 1984 Scholar)

A study of research into the Beef Industry and Forage and Fodder Conservation in the United Kingdom.

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## *ACKNOWLEDGEMENTS*

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## SUMMARY

Contained in this report are the impressions I gained of the beef industry and methods of fodder and forage conservation in the U.K. and some continental countries. A brief outline of my trip is important to understand the countries and centres visited from where this information was gained.

Our tour began on 27th February 1984 with a briefing at The Farmers' Club from the Director of Studies, Captain J. Stewart. From this point, the opportunities created by a Nuffield Scholarship became very real and the introductions during the first week to officials from A.D.A.S., N.F.U., M.A.F.F., the Australian Embassies and High Commission left no doubt that, used properly, the next five months would be one of the most significant periods of my life. Friday of the first week was spent at Wye College where a most important day was spent with Ian Reid who briefly outlined the concept, administration and problems of the E.E.C.. Part of the second week was spent in Brussels, where briefings with the ministerial advisors and N.F.U. representatives were important in our quest to understand the function and problems of the E.E.C. and, in particular, the C.A.P..

From Brussels to France, where highlights were undoubtedly the Paris Show, a visit to Rungis Market and the Port of Rouen, plus some excellent farm visits. On our return to the U.K. we visited the National Agricultural Centre at Stoneleigh and M.L.C. Headquarters at Bletchley before a two week tour of the South East Region planned by M.A.F.F.. By the end of this period we had been exposed to many excellent and varied enterprises which would be impracticable to include in detail in this report. The exposure to them, however, provided us with some alternative thoughts and ideas which will enrich our farming activities for many years.

The remaining three months were spent pursuing our individual studies during which time I drove 13,000 miles through the U.K. and the Continent visiting experimental husbandry farms, commercial and private enterprises.


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Mention must be made of the interest and hospitality received by us from the Research and Advisory Institute for Cattle Husbandry in the Netherlands, and the Federal Research Centre of Agriculture in Braunschweig, Germany. Knowing nothing of Nuffield Scholarships, when approached they organised most informative visits to both Holland and Germany.

Contained in this report are my observations of the beef industry in the U.K. with some reference to different production systems used in continental countries. It would neither be possible, nor practical, to describe the many different methods of production studied. Adoption of various systems by farmers varied greatly from calf rearing through to the age and weight at slaughter. I have, therefore, endeavoured to describe the most efficient systems as regards feed and labour, and include any points which may be relevant to beef producers in Australia feeding cattle at similar stages of growth. In making any comparison between beef production in the U.K. and Australia, there are several major differences which must be taken into consideration:-

(a) The fact that in the U.K. most beef cattle are housed for part, or all, of their lives.
(b) A large percentage of the beef cattle finished are bulls.
(c) The European market requires a leaner carcase than that at present required by Australian butchers.
(d) 80% of beef produced comes from dairy cows.

Forage conservation and grass utilization is of prime concern to beef production, and is covered in the second part of this report. When considereing the silage and grass production, and consequently beef produced per hectare (ha), it is important to recognise that the relatively higher price received for the end product allows for a much increased level of inputs. This is evident in the amount of nitrogen (N) applied for maximum grass production at the expense of clover and in the investment in machinery to harvest and handle the crop. New varieties of Diploid and Tetraploid rye grasses have been bred which respond to European climatic conditions and high N applications, resulting in yields which may not be possible to achieve under most Australian conditions.

Of particular interest is the maize silage beef and silage made from harvesting a total crop where, I believe, we could achieve yields comparable to those in the U.K. with an equal feed value.

Because the costs involved in beef production in the U.K., e.g. housing and associated costs, land prices and rent, are vastly different from those in most Australian enterprises, and likewise the prices received by the producers are affected by cow subsidies and beef premiums, I have avoided the use of gross margins in this report, except for comparison, as, to a great extend, they would not be relevant. The principles involved in beef production, however, remain constant, and feed and forage costs are determined by the individual's management skills.

# THE EUROPEAN ECONOMIC COMMUNITY

Because of the effect the E.E.C. has had on Australian agriculture and the problems, I believe, it will create in the future, it is worth noting some objectives of the Common Agricultural Policy.

The Treaty of Rome, which set up the E.E.C. in 1957 set out the objectives of the C.A.P. as follows:-

(a) To increase agricultural productivity.
(b) To ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture.
(c) To stablise markets.
(d) To ensure reasonable consumer prices.
(e) To assure reliable supplies.

As one commentator observed, "They put a carrot in front of agriculture and the industry bolted." Whereas the Community was a major importer of agricultural products at its inception, the rapid increase in production has meant that the Community is now a large exporter of many agricultural products.

Among products the Community has achieved self-sufficiency in are

| | |
|---|---|
| wheat | - 118% |
| sugar | - 124% |
| cheese and butter | - 117% |
| beef | - 106% |

This production initially had the effect of eliminating some traditional Australian markets. A more serious consequence is the increased competition we now face in selling our agricultural products on the world market against the subsidised surpluses of the Community.

Having achieved self-sufficiency, the problem now is to curb production. An example of how difficult this is going to be was shown with the introduction of dairy quotas this year. With all

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producing countries having agree, in principle, only in the U.K. actually reduced production. The main problem appears to be lack of accurate production figures in many member states at the farm level.

# BEEF PRODUCTION IN U.K.

## INTRODUCTION

The beef industry in the U.K. is in the unusual position of having approximately 75% of the animals slaughtered for beef being bred from daity cows. This, coupled with the growing influence of the Holstein, has created some problems for the industry which are requiring special skills from beef fatteners and processors.

As in most beef producing countries, continual changes are required trying to predict future consumer demand, with such variables as the amount of fat required, the maturity of the meat, quality with regard to tenderness, size of the actual carcase and subsequent size of the cuts available. I believe, the industry is putting itself at some risk with the widespread use of the hormone imlplants until they can be proven to have absolutely no residual effect in the carcase. Any evidence to the contrary would have a severe impact on the per capita consumption of beef, which is being critically analysed continually by health conscious consumers, sceptical of the long term consumption of animal fats.

## CONSUMPTION

Beef/veal consumption has been falling steadily since a peak in 1979 and as a result of the economic recession can be expected to fall for the fifth consecutive year in 1984. Although total beef production has fallen slightly, the amount produced now exceeds that consumed to the extend that now self-sufficiency is at approximately 104%. With the introduction of milk quotas in mid 1984 and the consequent slaughtering of dairy cows, a much greater surplus can be expected in the short term. However, the reduced number of cows calving from 1985 onwards should cut production for a time from that point. Of concern, at present, is the mounting intervention stockpile of some 600,000 tonnes.

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BREEDING COW NUMBERS U.K.

In June 1983 there were 4.69 million breeding cows, of which 71% (3.33 million) were dairy cows, leaving 29% (1.36 million) beef cows. The beef herd has fallen steadily since 1975 when there were 1.9 million cows on U.K. farms, reflecting the low profitability of beef suckler herds. The increase in dairy cow numbers over this period has produced a slight nett gain in total breeding cows until mid June 1983.

Of the 961,000 tonnes produced in 1982, 2,652,000 head were steers and heifers, 101,000 bulls and 786,000 cows.

The prime aim of the beef fattener is to purchase animals, either calves or store types, with a conformation that will enable the carcase to grade when the animal has the required fat cover.

The importance of the carcase having the conformation to grade becomes clear when the market price is below the target price.

TARGET PRICE

The target price is the price against which market returns are measured for the purpose of calculating premium payments. The price varies weekly to take account of seasonal variations in producer returns and to encourage orderly marketing of cattle. Target prices are set in May each year for the following 12 months.

The only animals to qualify for the premium steers, heifers and young bulls. Steers must weigh a minimum of 380 kg live and heifers 330 kg.

When presenting carcases, the minimum carcase weight for steers is 204 kg and for heifers 175 kg.

For young bulls to qualify, the carcase must weigh a minimum of 204 kg and be of good conformation. The forequarters may be slightly heavier than steers and the colour not too dark.

With most calves for beef production coming from the dairy industry, a basic system seen operating on most farms would be to purchase the calves at approximately 7 - 10 days of age in batch sizes to suit the farmer's facilities. Calves are fed on a milk replacer and usually have access to concentrates at this point.

## HOUSING

There were many differing attitudes to housing and feeding purchased calves. Some producers left calves in groups of 6 - 10 in small pens and considered the risk of the spread of disease did not warrant separation for this stage. Other systems favoured separation of calves either in individual stalls or by tethering on chains along the feeding rail for the first 3 - 4 weeks. This part isolation had the effect of reducing the spread of disease from an affected calf to the remainder of the pen. Generally, all calves receive 1 BR vaccine and combined vaccine against E Coli Salmonellosis and Pasturella.

## FEEDING

There were as many variations in attitudes to feeding calves as there were to housing them. Quite a lot of work is being carried out on early weaning systems which some farmers are adopting. The calves have access to concentrates at 18% protein and are fed 7 kg of milk replacer. At 22 days, or as soon as the calves are eating 1 kg per day of concentrate for 4 days, they are weaned onto a diet of silage and concentrates with no apparent problems. Many farmers preferred the 5 - 6 weeks weaning and some expected digestive and pneumonia problems on the early weaning system.

The weight gains achieved are very similar in both systems - approximately 0.5 kg per day to 5 weeks - so the decision on the choice of system would depend on the efficiency of feeding milk replacer and the cost of concentrates as more concentrates are used on the early weaning system.

## 12 - 14 MONTH BULL BEEF

Again, 75% of the bull calves used in this system are produced in the national dairy herd. The calves are usually reared in a beef shed and fed a milk substitute powder and concentrates until weaning. After weaning the bull calves are fed a ration, decided most economical by the producer to achieve a live weight gain (L.W.G.) of at least 1 kg per day, resulting in live weight of around 400 - 500 kg with sufficient fat score and conformation to grade at approximately 12 months of age.

Calf rearing costs varied significantly over the producers' results collected on Beefplan (a M.L.C. recording system), with some units feeding calves in excess of 20 kg per head of milk replacer. Most of these units were run on an ad lib feeding system or automatic dispensing machines. Calf rearing costs rose significantly once calves consumed above 20 kg of milk replacer per head and the cost per kg of L.W.G. was up to 20% - 30% more.

## POST WEANING

Depending on the market the calves are destined for and the time of year, this stage of feeding varies greatly. This feeding programme is one suited to producing 12 - 14 month bull beef as the ration and weight gains would produce a carcase which, I believe, would be suited to the Australian market requirement when fed to a similar aged steer.

From 10 weeks bulls are fed good quality silage at approximately 25% dry matter (D.M.) made from young grass cut at a D value of 70. With silage of this quality and concentrates at 2 kg per day, a daily L.W.G. of 1.0 to 1.03 kg should easily be obtained. If the quality of silage used is inferior, the same weight gains can be achieved by using more concentrates, but the cost per kg of L.W.G. rises slightly.

## EFFICIENCY

By turning the animal off in 12 - 14 months, the producer has the opportunity to feed it through its most efficient and economical stage.

| LIVE WEIGHT/KG From | To | FOOD CONVERSION EFFICIENCY (F.C.E.) | FOOD COST/ KG L.W.G. |
|---|---|---|---|
| 128 | 448 | 4.3 | 58 p |
| 448 | 490 | 8.2 | 111 p |
| 490 | 520 | 10.5 | 125 p |

### COMPARISON OF IMPLANTED BULLS, BULLS AND IMPLANTED STEERS

| | IMPLANTED BULLS | BULLS | IMPLANTED STEERS |
|---|---|---|---|
| Weight at sale (kg) | 412 | 408 | 403 |
| Days from arrival to sale | 345 | 354 | 363 |
| Daily L.W.G. 3 months to slaughter (kg) | 1.13 | 1.09 | 1.06 |
| Carcase weight (kg) | 230 | 225 | 221 |
| Killing out % | 55.8 | 55.1 | 54.8 |

## CLASS VARIATIONS

Bulls are the most efficient converters of feed to beef. However, implanted steers are only slightly behind bulls and there are some advantages handling steers.

The heifer is approximately 10% less efficient than the bull of the steer, however, the reduced calf cost can make it an alternative in some situations. The main difficulty is achieving a satisfactory carcase weight with acceptable levels of fat cover.

## FEED CONVERSION EFFICIENCY

In any system, the first aim is to convert the available feed into beef at the most efficient rate, the ultimate objective being to produce a carcase that will attract the maximum cents/kg using the least amount of feed during the shortest period.

During the animal's life time it has the ability to convert feed to L.W.G. at differing rates, e.g. at the N.A.C. Beef Unit 5 week old calves were converting 3 kg of concentrates to 1 kg of L.W.G. . At the other end of the scale, Friesian cross bulls of 550 kg were eating 10.8 kg of ration for 1 kg of L.W.G..

## BREED COMPARISONS IN CATTLE - VARIATION IN BODY WEIGHT, FOOD INTAKE AND FOOD EFFICIENCY

Among cattle breeds there are obvious differences in appearance, size and shape and production levels. For example, in dairy breeds the Friesian is considerably larger in size than the Jersey and has much higher milk yields. In beef breeds the Charolais has a faster growth rate than the Angus and larger carcases at slaughter. How breeds differ in efficiency of production is far less obvious and much more difficult to assess because of the problems of measuring the inputs - in particular, food intake.

A question of major importance to animal breeders is: "How much variation is there in production efficiency between breeds relative to that within breeds?", for this will determine the optimum breeding programmes to be followed for increasing production efficiency.

Another question of fundamental importance to animal breeders is: "What are the inter-breed relationships between size, growth rate, milk yield, food intake and food efficiency. Information on these relationships will answer such questions as: "Are large cattle more efficient than small cattle, and what are the correlated responses to be expected when selection is based on a limited number of production traits such as growth rate or milk yield".

## MULTIBREED EXPERIMENT

A multibreed experiment designed to answer these questions has been set up at ABRO's Blythbank farm. In this experiment about 12 animals from each of 25 different British breeds are being bought together and their body weights and food intake are being recorded every 2 weeks. Milk yield is also recorded during lactation. Female calves from the respective breeds are purchased at about 2 - 3 weeks of age and fed on a milk diet till 12 weeks of age. They are then weaned onto a single complete pelleted diet which is fed ad libitum throughout until the production of their third calf. To enable food intake to be recorded the diet is fed through a system of Calan-Broadbent electronic gates. Females are mated by A.I. in accordance with a specific mating schedule to produce both purebred and cross-bred calves. The progeny also enter the experiment and they are reared for slaughter so that the basic unit of production being studied is the cow and her calf.

A total of 300 animals from 25 breeds have been included. The beef breeds, dairy breeds, dual purpose breeds and rare breeds represented are Aberdeen Angus, Ayrshire, Beef Shorthorn, Belted Galloway, British Charolais, British Friesian, British White, Dairy Shorthorn, Devon, Dexter, Galloway, Guernsey, Herefore, Highland, Jersey, Kerry, Longhorn, Luing, Lincoln Red, Red Poll, Red and White Friesian, Shetland, South Devon, Sussex and Welsh Black.

## RESULTS

Some interesting results are emerging for body weight, food intake and food efficiency from 3 - 18 months of age. This age range corresponds to an 18 month system of beef production and will also avoid the influence of late pregnancy on production.

The body weight curves for the 25 breeds were quite distinct even though there were, on average, only 12 animals per breed. Over this age range the curves were almost linear in form and between breeds there was a high correlation between weights at one age with weights at all other ages so that breeds tended to maintain their position relative to each other. The range between the largest breed (Charolais) and the smallest breed (Dexter) was almost two-fold and this was maintained over the period from 3 - 18 months.

The food intake curves for the 25 breeds ranked in approximately the same order as those for body weight. The range between the breeds highest and lowest intake was about 1.7 fold. Food intake as a proportion of body weight declined with age. From 3 - 6 months the average food consumption per day was about 3.5% of body weight, whereas from 15 - 18 months the average food consumption per day had declined to 2.5% of body weight. There was, however, a high between-breed correlation of body weight with food intake so that it should be possible to predict the food intake requirements for breeds of different body size.

Food efficiency has been measured over successive 3 month intervals as the ration of live weight gain to food intake. As would be expected, efficiency declined with increasing weight and age due to the greater proportion of food intake being utilised for maintenance and also the changing composition of the L.W.G., heavier animals tending to lay down more fat which has a higher energy value per unit of weight. Over the first period from 3 - 6 months the average value for food efficiency (gain/food) was 18% but this declined to an average value of 8%, over the period from 15 - 18 months. Food efficiency over the total period had an average value of 11%.

Although the small number of animals per breed will not allow accurate ranking of breed means, the experiment has been effective in estimating variation among the 300 animals from the 25 breeds for the traits of body weight, food intake and food efficiency over the age range of 3 - 18 months. For all three traits there was considerable variation, although this was less for food efficiency compared with body weight and food intake. The amount of variation suggests that there is ample scope for changing these traits by selection. Whether this would be most effectively carried out by between-breed or within-breed selection will depend on the relative amount of variation between and within breeds. The amount of genetic variation between breeds as a proportion of the total variation within the between-breeds has been estimated from these data. For both body weight and food intake, the majority of the variation was between breeds, being respectively 70% and 60% at 18 months of age. This contrasted with cumulated food efficiency where the between-breed genetic variation was estimated at about 20% of the total variation at 18 months of age.

## CONCLUSIONS

The experiment confirms that the variation between breeds in body size and growth rate greatly exceeds that within breeds and that both these traits would be more effectively changed by between-breed selection, rather than within-breed selection.

For food efficiency, the proporation of variation between breeds is considerably less and there appears to be no strong association with food efficiency and breed size. However, there is scope for improvement in food efficiency which could be brought about by between-breed selection, but further improvement can be effectively made by selection within breeds.

Another outcome from these results is the large range in food intake requirements associated with breeds of different body size. If food availability for individual animals is limited, then the larger breeds will be less able to meet their food intake capacity and may then become less efficient. Further, if food intake is restricted by seasonal conditions, this will affect the time taken by breeds of different body size to reach their optimum slaughter weights. There is therefore, a need to match breeds of different body size with their food intake requirements in order to optimise production efficiency.

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BEEF PRODUCTION PER HA

The highest beef production per ha was that seen at Rosemound in a year round silage beef system. This enterprise did not include a period of grazing and was conducted using Hereford cross Friesian bulls and Friesian bulls.

The whole season yield from long term grassland on short term leys, usually Italian ryegrass, receiving 300 kg of N per ha, is on average 10 - 12 tonnes of D.M. per ha, although yields of up to 20.7 tonnes/hs D.M. have been achieved from first year Italian ryegrass. On average, 2 - 3 cuts of silage at 8 tonne/ha (32 tonne/ha of 25% D.M. silage) have been cut. This is sufficient to feed 8 Hereford cross Friesian beasts at 1 tonne of D.M. silage per head, plus cereals, usually barley, at between 710 and 780 kg per head. The stocking rate per ha, including that used for cereal production, is shown below, along with carcase weight produced per ha.

| | |
|---|---|
| Area per beast - grassland | 0.13 |
| - cereals | 0.10 |
| - total | 0.23 |
| Mean carcase weight (kg) | 232 |
| Stocking rate/ha | 4.34 |
| Carcase weight/ha (kg) | 1,009 |

The amount of beef produced per ha on this system is 30% greater than the 18 month system which included a summer grazing period. Reasons influencing the increased production are:-

(a) Reduced grass loss due to paching and dund and urine patches

(b) Increased animal performance as no contamination of grass with internal parasites.

Obviously, the cost of putting the feed in front of the animals would decide the profitability of such an enterprise, but its worth noting the amount of carcase been which can be produced.

SUCKLER COWS

At the other end of the scale for production per ha would be the suckler cow. Here the choice of farming systems vary enormously, as do breed types for matrons and bulls. However, taking average figures for top 30% of producers on similar conditions to those described in the 12 month silage beef system, the production figures would be:-

| | |
|---|---|
| Stocking rate | 1.9 - 2.2 cows/ha |
| Calf daily gain | 1.1 kg/day |
| Sale weight | 325 kg |
| Killing 53% | 172 kg carcase weight |
| Beef produced/ha | 361 kg |

This is less than half that achieved in a grazing feeding system and just under one-third as much produced in a 12 month silage beef system.

The main problem with the suckler cow system is the two stage process of converting feed to milk then milk to calf growth. Because the object of this report is to look at maximising production per has and efficient feed conversion, the suckler cow will not be considered in great detail. The rewards to the farmer producing a beef animal for slaughter or fattening are hard won at present in the U.K., as well as in Australia, the price for beef suckler calf would have to increase markedly to encourage farmers to produce such animals.

HAY OR SILAGE

Ten years ago, 80% of the forage conserved in the U.K. was made as hay. Today, silage accounts for more than 50% of conserved forage and the popularity of silage is growing. For successful hay making, sufficient water has to be evaporated from the crop to enable it to be stored without the risk of deterioration through heating or mould growth. In practise, this means a reduction in eater content from over 80% to 20% or below. Initially, the plant resistance to water loss is low and the limit to the rate of water loss is set by the environment. Radiation is the single most important factor in evaporation,

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hence spreading the crop over the maximum area is beneficial. The process still requires around 5 days of fine weather and further problems are encountered trying to dry a heavy crop which would provide the best chance of harvesting the maximum D.M. per ha. Though conditioning at mowing and subsequent tedding helps speed up the drying process, there are unavoidable nutrient losses below 50% D.M..

The object of silage making is to conserve forage as quickly and cleanly as possible with minimum loss of feed value. The grass is preserved when the sugar is fermented into acid by bacteria. This is only achieved when there is sufficient sugar in the grass, more than 3% of fresh weight and air is excluded from the silage pit.

## FORAGE CONSERVATION

To maintain an even output of production or to take advantage of producing beef out of season, the technique of harvesting, storing and feeding the flush surplus fodder must be carefully examined. Much of the surplus forage is still harvested and stored as hay. The grass is usually cut at a late stage in maturity, with a crude fibre content exceeding 30%, largely due to restrictions of weather.

High mechanical field losses are common and fungal deterioration during storage often results in a product only suitable for maintenance. Irrespective of climatic conditions, the system of hay making proves to be the least efficient conservation method. This is still true despite important advances in the technical efficiency with mowing and conditioning machinery, big baling and bulk handling systems.

## ADVANTAGE OF ENSILING

Ensiling is of increasing importance in handling nutritious lady swaths at optimum cutting stage with less risk of weather damage. The advantage of appropriate mechanisation is well recognised and now considered essential to fill the silo and seal it in the shortest possible time. When the crop is ensiled anaerobic bacteria present on the plant material ferment the sugars in the cell into acids. Under good conditions, with total exclusion of air, the lactobaccilla (bacteria which convert sugar to lactic acid) predominate, lactic acid is formed and the material is stablised.

However, if the crop is wet or has a low sugar content, insufficient acid is produced and other bacteria, notably clostredia, break down the lactic acid to butyric acid and degrade the proteins with production of ammonia. This results in unpalatable silage, high losses and reduced digestibility. Legumes tend to show this type of fermentation and should, therefore, be ensiled after a period of field wilting and in some cases with the use of an additive.

## FORAGE CONSERVATION

The success for any beef production enterprise will be determined largely by the quality of the feed. When considering alternatives available to harvest, store and feed forage, among the most important points to consider are:-

(a) The crop species most suited.

(b) The method of conservation, e.g. hay or silage.

(c) The efficiency of feeding.

The choice of system will be influenced by prevailing economic circumstances and the amount of forage to be harvested. As it would not be practical to cover all the alternatives, I will consider a selection of crops and a comparison of different harvesting, storing and feeding systems.

## CROPS

### 1. Permanent Pasture

Much of the forage conserved in the U.K. at present comes from permanent pasture. These swards may contain a wide range of species and under favourable conditions are capable of producing auite high yields. However, under intensive use it is perennial rye grass which persists and remains productive, and the value of old pastures is related to the content of such rye grass. This is explained when applications of N at 300 kg/ha plus are used to achieve maximum production. At these levels, clover does not make any significant or reliable contribution, and is quickly dominated by the rye grass. In favour of the use of permanent pasture is that no loss of production is incurred during re-seeding, nor are the costs associated with re-seeding.

2. Short Term Leys

Some very high yields are being obtained in the first and second years of new leys. Italian and perennial rye grass account for 85% of all the herbage seed sown in the U.K. and have achieved consistently high production. Plant breeders have now produced a new range of stable tetraploid rye grass varieties which are quite unique. These leafy tetraploid rye grasses have been bred to most desirable factors, e.g. high D.M. yield, persistency, winter hardiness, etc. and when mixed with the existing diploid species develop a highly productive, versatile swath. This pasture responds to high applications of N and is highly suited to the short term ley. Rye grasses have a high sugar content and are one of the best choices for making into silage. Tetraploids have a higher sugar content than diploids.

3. Whole Crop Forages

Whole crop forages are not widely used in the U.K. as yields are not much above those achieved with pasture where 2 - 4 cuts are taken. In continental countries much use is made of maize where it can be successfully grown. Trials have been carried out - some of the results will be included as I believe they could have particular relevance to Australian conditions where only one cut is obtainable. In these circumstances, it is essential to harvest the maximum D.M. at the highest D value and forage crops have a place in achieving this.

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In Holland, at the Research Advisory Institute for Cattle, I was shown a beef enterprise where cattle were fed on a diet of 85% maize silage. In fact, farmers are advised against beef production if any less than 80% of the diet in D.M. comes from maize silage. Average yields are 55 tonnes/ha at 27% D.M., which would feed 8.9 bulls/ha. Feed is supplemented with concentrates at 18% (approximately 3 - 4 kg/day).

Almost an identical system is used in Germany beef enterprises and of interest is the fact that no hormone implants are allowed. The reason is because they believe beef exports would be at risk if this practise was followed. However, the use of products such as Rumensin and Flavomycin are permitted which, on average, cause a 5% reduction in feed intake with a similar increase in conversion efficiency.

THE SILAGE PIT

There are many different silage clamps in operation which should provide:-

(a) easy access.

(b) efficient compaction.

(c) walls which can be lined to provide complete sealing.

Silage clamps used include:-

(a) pits open at one end

(b) drive through pits with temporary walls.

(c) earth walls.

One of the main considerations in the choice of silage pit must be the cost. Thought must also be given to the use of the pit, e.g. if it is to be self fed, allowance must be made for drainage and slurry removal.

I was impressed with the research being carried our in Braunschweig by Dr. Honig into in-store losses in silage. Of particular importance was the length of chopped material, compaction and air expulsion.

The width of the pit is most important as once opened, research has shown, the pit face should be used at the minimum rate of 1 metre/week. When silage is exposed to air during the feed out period, it is subject to deterioration, particularly if it is well preserved. This aerobic deterioration or secondary fermentation is caused by aerobic micro-organisms whch have previously been denied access owing to the anaerobic nature of the ensiling process. The result of this activity is a loss of nutrients and subsequent feed value of the silage. Once the process of aerobic deterioration has begun, it is practicaly impossible to stop.

Air is the most important single factor. Since it can exert its influence from the time the silo is filled until the product is finally eaten, ensiling technology and silo management are closely related factors. Susceptibility to aerobic deterioration may be increased in the early stages of ensilage by slow filling and a delay in sealing which allows a build-up in the population of aerobic micro-organisms which remain latent until the silo is opened.

I was impressed with the machinery used by British farmers and their capacity to ensile large volumes of material quickly. However, much of the industrial equipment being used to remove silage from the pit appeared to loosen the dace to unacceptable levels exposing too much material to air and the risk of secondary fermentation.

By comparison, the smaller scale of operation observed on the continent, where much of the silage is removed by block cutters and smaller equipment, leaving a very tight face of the pit, appeared to reduce the risk of exposure to air and deterioration at this point.

No doubt, one of the reasons silage making is not so widely practised in Australia was the difficulty of handling the material and obtaining a consistent, good quality when the process was introduced. The availability now of fine chop and precision chop forage harvesters should see the popularity of silage making increase. The consistent short length of the material processed allows for almost total air expulsion at ensiling, resulting in much higher quality. The silage is considerably easier to handle when feeding out and when harvested with a precision chop harvester can be used in much of the feed mixing machinery currently available. The cost of machinery is a major factor in silage production and unless large quantities are to be made, the use of a contractor or farmer syndication may present the best alternative.

## CONCLUSIONS

Those involved in the beef industry in the U.K. in the last decade have had considerable support through intervention buying, grants for capital works, cow subsidies, machinery depreciated over 12 months etc..

Most farms visited had coupled the improved returns with good management to develop some very efficient beef units. Mention must be made of the professional attitude of the farm staff, who, in many cases, had received a tertiary education in Agriculture and were quite competent to share the responsibility of management.

I was impressed that the industry has been prepared to produce and market a leaner carcase with greater consumer appeal. Using slaughter techniques such as electrical stimulation to reduce the effect of "cold shortening", and more recently, the use of papien, an enzyme extracted from the paw paw which has the effect of producing a more tender carcase.

Improved fodder conservation systems continue to enhance the quality of the fodder conserved, particularly in silage and the use of industrial machinery allows for some lard and efficient operations.

However, with the E.E.C. now at 104% self sufficiency in beef, I believe the profit margin will narrow further and rewards in the beef industry will be hard won.