Report of Visits to France and The United Kingdom

By DAVID G. RAFF (Queensland 1979)

Report by:

David G. Raff "Forres" KARARA Qld 4352

INTRODUCTION

The purpose of my Nuffield Scholarship was to study all aspects of the beef cattle industry in Britain and the Continent, including the management, breeding and marketing, with particular emphasis on performance testing and sire evaluation. Also to look at these aspects associated with beef production such as grazing and feeding principals, grain growing and general farm management.

While the conditions for farming in Britain are so vastly different to those in Australia, and in particular Queensland, I found my trip to be most rewarding and thought provoking.

The basic differences between farming here and in Britain are that their seasonal conditions are predictable and reliable and that they are selling their products on a guaranteed and protected market.

The ability of the British farmer to achieve maximum production from his land and stock is unquestionable, as is their general farm management technique.

While my aim was to study all aspects of the beef cattle industry there was much more gained than that. The appreciation of the complexities of farming in the world beyond Australia, the awareness of the social and political issues facing a growing society and above all else the people that you meet through the Nuffield Organisation.

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BEEF CATTLE

The beef cattle industry in Britain is unique in that 70 per cent of its production comes from the dairy indusstry, either as a pure dairy animal or dairy/beef cross.
Pure commercial beef herds are in the minority, as is the specialist beef producer.
The stud beef herds are intensive and small in herd size, with few stud breeders involved in commercial beef production. Bulls are sold mainly for pedigree stud breeding or to A.I. centres with a very limited commercial bull market.
In the early 1960's the demand was for an animal that matured early, was short, compact and low to the ground. Today this type of animal is uneconomical to produce, it has a low weight gain, poor carcass quality with a high fat to meat ratio and is not acceptable to the trade.
As a result there is beginning to evolve a more efficient, economic and productive animal to meet present day requirements.
To assist in this program much is being done by research organisations to find ways and means which can help breeders in their efforts to select the right type of animal for breeding.

BEEF RECORDING AND PERFORMANCE TESTING

The first recording was started in the early 1960's when recording for weight for age of pedigree cattle in Britain was started by individual breeders. This work was co-ordinated in 1964 and extended by the Beef Recording Association and in 1968 was incorporated into the Meat and Livestock Commission (or MLC as it is known), who are currently involved in the major part of beef recording and performance testing in the country.
Performance testing involves rearing animals of a similar type together and measuring the important production characters under uniform management conditions, so that accurate comparisons can be made.
Growth and feed conversion efficiency are highly heritable — i.e. they are passed on to a large extent from parent to offspring. It is, therefore, practical to measure these factors in growing breeding animals and use the information in selecting or culling.
The main measurements are growth (weight for age), feed conversion efficiency, skeletal size and back fat thickness.
While the MLC is the main organisation involved in performance recording, there are others also doing work in this field. The Milk Marketing Board (MMB) with their progeny testing program for selecting superior sires for A.I. and the Animal Breeding Research Organisation who have just begun a program on selection for production of lean meat.

MLC PERFORMANCE TESTING

When the MLC incorporated other beef recording programs into one of its own in 1968 its objectives was to have uniformity on farm pedigree herd recording.
Currently 1,400 herds of 23 breeds participate in the scheme. The bulls recorded in these herds account for two thirds of all bulls registered. Percentage varies between breeds. In the Continental breeds — Charolais, Simmental etc. — it is more or less 100 per cent; in the native red breeds — Lincoln Red, Sussex and Devon — it is over 80 per cent; in the Hereford and Angus breeds it is about 40 per cent.
It is assumed that a 50 cow herd is the minimum size for making genetic improvement for performance. With the average herd size in Britain 21 head it is difficult to fully utilize performance recording and make genetic improvement.
The MLC on farm pedigree herd recording is based on regular three monthly weighing of growing cattle. Information is provided on weights from birth to 600 days of age, with the majority of breeders using the 400 day weight as their final recording. While the 400 day weight is regarded as 80 per cent reliable as a growth indicator for bulls, I seriously doubt the significance of this and feel they should be looking at a later, even 600 day, weight to ensure they are selecting animals with a continuing growth curb. I have seen too many bulls that have had big 400 day weights then stopped growing.
I was interested in the result of a survey conducted in 1979 by the Animal Breeding Research Organisation amongst a sample of breeders of pedigree cattle. They were selected from those with the largest number of registered cattle of the major breeds. The main aim of the survey was to assess breeders priorities in selecting breeding stock.
On average half the herds were weight recorded and one quarter used performance tested bulls.
The results clearly illustrated a change in attitude in priority. In their selection priority, the majority of breeders placed greater emphasis on conformation rather than breed type, head and character. Physical soundness was rated high as was fertility and ease of calving. So it is clear breeders want productive animals. However the most significant shift of emphasis was in the growth selection priorities. The one to receive most dominance was skeletal size (size of frame) ahead of weaning weight, weight for age, food conversion, muscle development and fleshing ability. The obvious conclusion of this survey was that breeders want large framed productive animals.
As frame size has had little attention in performance testing in the past it is now obvious that it is a vital factor which must be included in any performance recording. Large frames support long muscles, and at all stages of growth, weight of muscle bares direct relationship to size of frame. Experimental work has pointed to the necessity for a large skeleton for the efficient conversion of feed into muscle.
The MLC is now measuring all bulls for height at wither and including this measurement with weight data. Many breeders are actively promoting the importance of skeletal size growth and basing their selection on this.

One aid to selection of frame size is the FRAME SIZE SCORE which is a scale of age of animal related to its height at wither. This was first introduced in America and is now becoming very popular in Britain and could be incorporated into any Australian beef recording scheme to advantage. For satisfactory growth rate a bull should grow one inch a month from six to 12 months of age and half an inch from 12 to 24 months.

FRAME SIZE SCORE SCALE

Frame Score	Age in Months							
	6	9	12	15	18	21	24	
2	35	38	41	43	44	45	46	Height
3	37	40	43	45	46	47	48	
4	39	42	45	47	48	49	50	at
5	41	44	47	49	50	51	52	
6	43	46	49	51	52	53	53	Wither
7	45	48	51	53	54	55	56	

Frame score 3 is the average for British breeds.
Frame score 5 is the average for Continental breeds.

While height is not the only measurement which determines frame size it is the easiesst and most accurate to measure and is very closely related to all other skeletal measurements.
Young bulls with top performance records are taken a step further into what is known as THE YOUNG BULL PROVING SCHEME. This involves the test mating of the top performing young bulls with registered purebred females. One hundred doses of semen are released to 20 stud breeders (five each) with the progeny being tested against those of home sires.
This has two factors to recommend its use in Australia; the quantity of semen released is restricted to 100 doses thus ensuring that the bull will not become common as is the case with the Sire Reference Scheme, and secondly the cross section of herds in which the sire is used ensures it is tested against numerous bulls from different female lines.
While there are factors which influence variation in calf weight for age there is a need for correction of records to counter any variable factors that detract from the accuracy. Calf sex is the main source of variation and this difference tends to increase with age.
Age of dam is also an influencing factor in variation. Calves from cows four years and less are below average while cows from four to 10 years are above average reaching a peak at seven years. There is a decline to 10 years when they are again below average.
Performance testing programs in Australia have a correction factor for calves from young cows but none for older cows. This research illustrates the need for correction factors to be included for older cows as well as youung ones. While it is true to say that there are few animals kept in a herd after 10 years of age it is important to remember that if an animal is good enough to remain in a herd at that age they still have a contribution to make and should receive the necessary correction factors.

MMB PROGENY TEST PROGRAM

Artificial Insemination is a very important aspect of the cattle industry in Britain, with nearly two million inseminations carried out annually, 35 per cent are carried out with cattle from beef bulls. Because of the large volume of semen required from beef bulls the MMB has initiated a BEEF IMPROVEMENT PROGRAM incorporating a bull progeny test where calves by 40 different bulls of different breeds are brought in at five days of age and performance tested till they are killed at about 18 months of age.
The progeny test provides the following information on each bull tested which is used to select bulls for use in A.I. service:

(1) Calving difficulty and calf mortality per bull.
(2) Growth rates of the progeny of each bull.
(3) Carcass weight of the progeny of each bull.
(4) Carcass information on the progeny of each bull.

At the end of the test, bulls producing the best progeny are selected and rechecked for acceptable semen production and fertility before returning to the A.I. stud for extensive use as proven beef bulls.

BEEF CATTLE – FRANCE

It is well recognised that the Continental breeds of cattle have had a big impact on the beef industry over the past few years. In the South-West of France I saw some of the most advanced and practical cattle breeding and performance testing methods.
The largest and most advanced centre is MIDA-TEST, which is the union of co-operatives of the South-West of France.
MID-TEST has been created by 150,000 breeders to serve their needs and today represents one of the leading technical cattle breeding organisations in France and Europe.
The principal aim is to co-ordinate the effort of the separate co-operatives within the departments. By pooling technical resources selection of superior genetic material has become more efficient and breeding programs can extend over larger populations, permitting the use of more bulls.
In the South-West of France the regions cattle breeding plays a predominent part and each year the population

of 1,720,000 cows produces 200,000 tons of beef and veal. Seventy-five per cent, or 1,200,000 cows, are bred by Artificial Insemination. This represents one sixth of the total cow population of France.
Progeny testing of bulls in this area has been employed since 1957.
Improvements to the program since then include a very extensive program for planned matings with breeders for future A.I. sires and the establishment of performance testing centres.
The following beef breeds are the most important in the South-West of France for beef production:

Limousin ... 40 per cent
Blonde d'Aquitaine ... 17 per cent
Charolais ... 11 per cent

Seventy beef bulls, consisting of 35 Limousin, 20 Blonde d'Aquitaine and 15 Charolais, are progeny tested by Mida-Test every year. These numbers provide a high replacement rate of proven sires and a wide range of bulls for breeders.
To carry out such a breeding program effectively, it is essential to have the full co-operation of breeders.
In the Blonde d'Aquitaine breed almost 300 breeders have grouped together to participate actively in the selection program. Similarly about 30 Limousin breeders have grouped together to participate.
In all these co-operative breeding groups include some 3,000 pure bred recorded cows since 1971.

TESTING

The first stage is for bull calves to enter the ADAPTATION centre which has a capacity for 90 young bulls. They are grouped in uniform ages for approximately three months prior to entering the performance test centre.
Two CENTRAL PERFORMANCE TEST STATIONS have a total capacity for 130 bulls. Bulls enter at approximately eight months old and the performance test continues for 126 days and includes:

Growth Rate
Feed Consumption

Conformation Score.
SEMEN TESTING CENTRE — All bulls on test between nine and 15 months of age are thoroughly screened for semen production. Approximately one third are culled.
All young bulls which have been selected from the Performance Test, and which have passed on Semen Tests, are PROGENY TESTED. On farm progeny tests require 250 inseminations per bull on random commercial cows to produce a minimum of 60 progeny per sire. Evaluation is based on an index and the following criteria are evaluated:

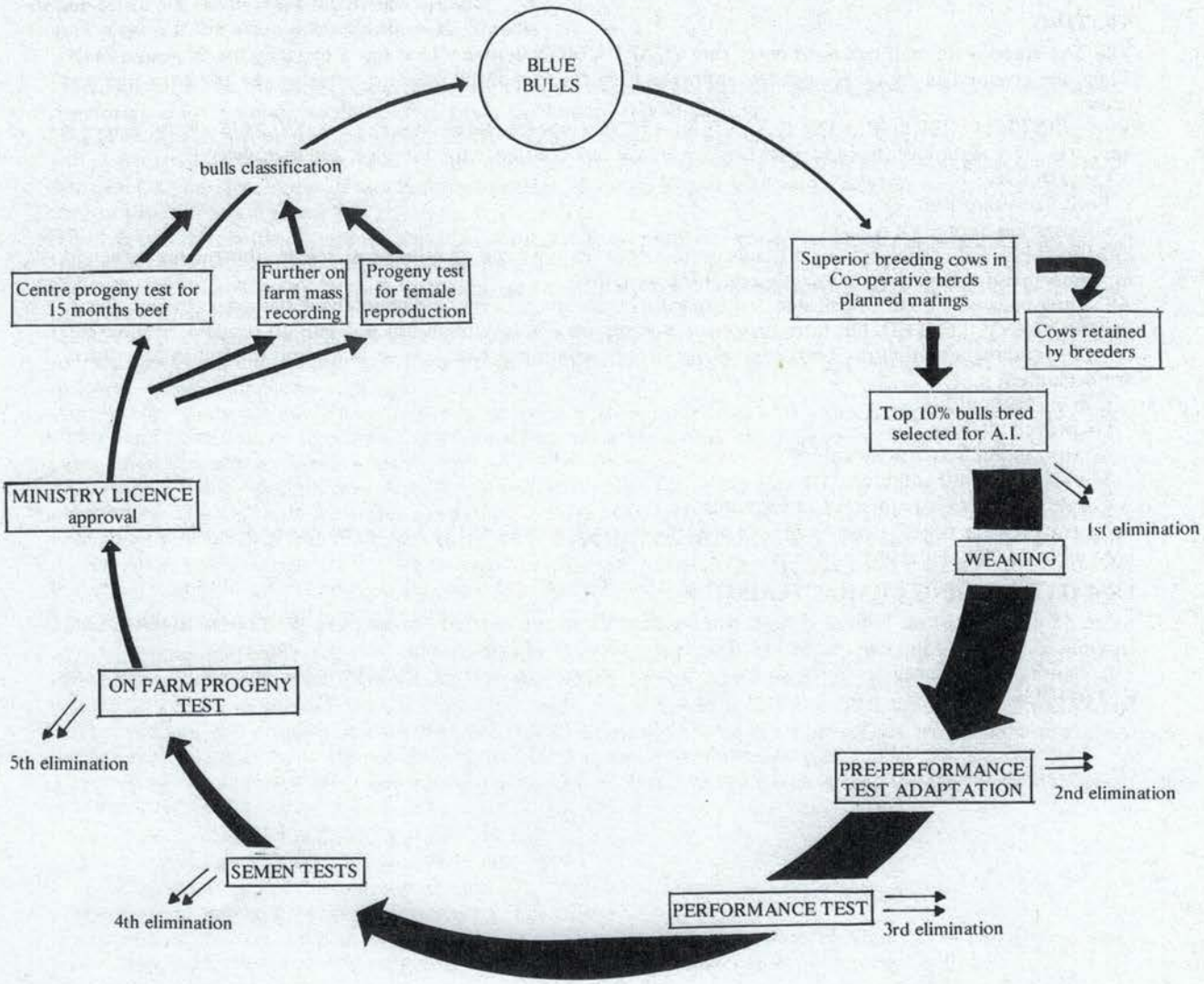
Calving Difficulties.
Growth to 90 days.
Conformation Score at Slaughter.
Market Value at Slaughter.
Combination of Growth and Conformation.

A central progeny testing centre will take progeny through to between 15 and 18 months of age. The station will hold up to 1,000 head at any one time.

FEMALE BREEDING CHARACTERISTICS

Since 43 per cent of all Blonde d'Aquitaine inseminations are carried out on pure bred cows, the Artificial Insemination sires' influence on the breeding characteristics of heifer replacements is important.
Two hundred heifer progeny of the six superior bulls on progeny test then undergo a progeny test for FEMALE REPRODUCTION.

The breeding program



SELECTION SCHEME – FEMALE REPRODUCTION

The breeding stock are chosen among the best males and females which have obtained the best characteristics for growth rate, feed conversion and production of meat.

Bulls which have been selected on performance are then tested by their progeny with regard to their desirable transmitted criteria and their likely influence.

FIRST TEST

Females of one breed are mated by A.I. to various bulls of different breeds as terminal sires.

Males from this control are submitted to different controls with regard to individual performance for weaning weight, fattening ability and carcass yield and quality.

SECOND TEST

The raising of 20 heifer descendants of six different bulls and tested for weight gaining ability, conformation, fertility and reproductive ability.

BASIC QUALITY INDEX

Females, the progeny of superior bulls, are then indexed following their reproduction tests using a BASIC QUALITY INDEX.

(1) Growth and conformation index ... 10 per cent
(2) Fertility, sexual maturity, conception and ease of calving ... 50 per cent
(3) Mothering ability and attitude to calf ... 10 per cent
(4) Milking ability, growth and conformation of calves ... 30 per cent

All heifers are joined to calve at two years by A.I. Heat synchronisation is practiced and hormone treated, heifers used for teasers.

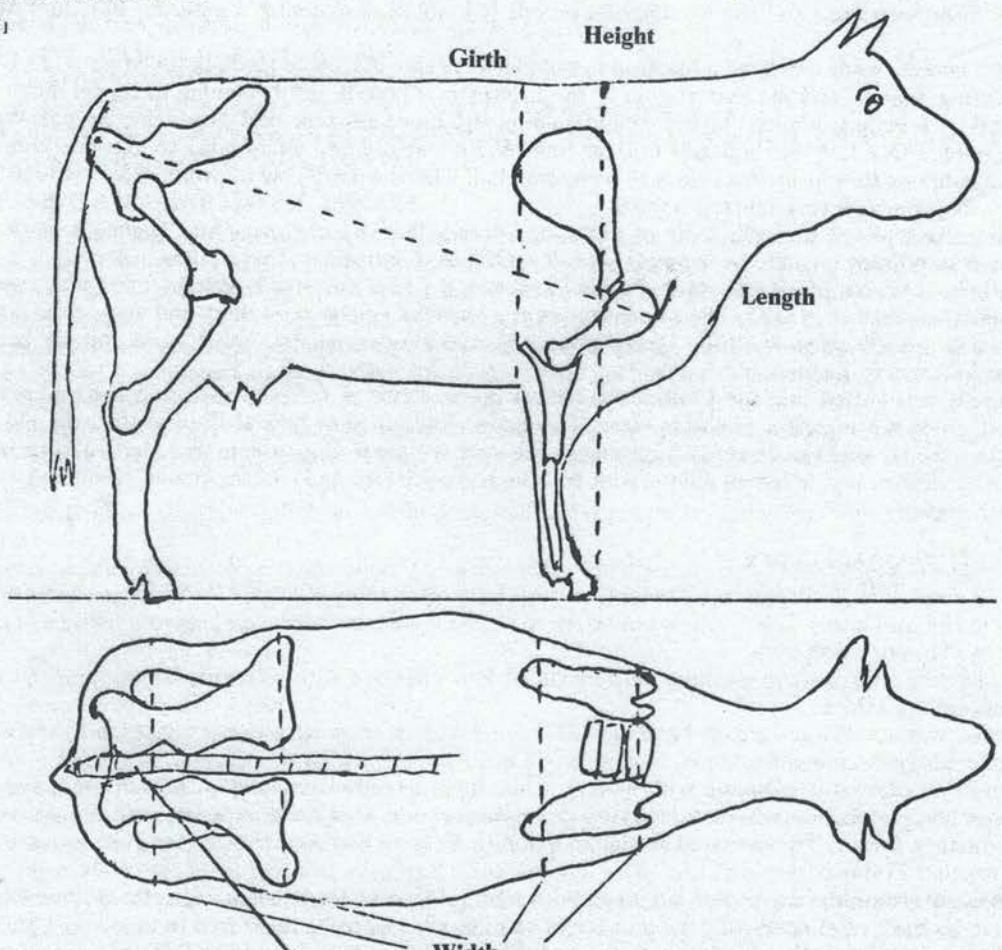
MILK PRODUCTION of each heifer is measured. The calf is starved for a set period then weighed, allowed to suck the cow dry and then reweighed – the weight difference being milk produced.

SKELETAL MEASUREMENTS are taken regularly and are regarded as a more predictable indicator of growth rate and breeding potential then weight.

PELVIS size and shape is a vital factor influencing ease of calving. Internal pelvis measurements are taken at 14 days after calving, both horizontal and vertical.

The SHAPE of the animal is considered important, the spine must be straight with a straight extended tail head, the pin bones must be wide.

SKELE



Internal Pelvis, Vertical and Horizontal

SUMMARY

The aspect of all performance testing work being undertaken in France is the emphasis being placed on the basic commercial requirements for profitable beef production.

The reproductive ability and sexual functions of breeding stock is probably the one aspect to be receiving the most attention. Results clearly indicate that the most efficient animal at both producing beef and reproducing is a tall large framed animal. A large framed female has a greater capacity to produce milk, produces a larger framed or more streamlined calf that she can produce naturally. A large framed animal — a greater growth potential. Large frames support long muscles thus eliminating internal pressure on breeding females caused by round bulgy muscles that inhibit reproductive ability.

Skeleton shape is also important. The spine must be straight in particular from the hip bones back, with wide pin bones. This is related to pelvis size and shape, a vital factor in ease of calving.

BEEF CATTLE – THE UNITED KINGDOM

CROSS BREEDING

With 70 per cent of beef produced in Britain coming from a dairy breed background, the use and importance of cross breeding is significant. Because of this background the industry requires a terminal sire with maximum beef producing qualities to produce an animal of high growth rate and a high yielding carcass.

The interesting aspect of cross breeding in Britain is that:

a. Only pure bred sires are used.
b. The cows used are either pure dairy or first cross cows bred specifically for beef mothers for a particular environment.

As a result there are numerous specialist breeders breeding the parent stock for cross breeding and the beef producer breeding animals and selling all the progeny, both male and female, either as stores or fats. This entails:

(1) The breeder of a terminal sire.
(2) The breeder of cross bred mothers.

This can be placed on a parallel with the fat lamb industry in Australia.

BREEDS

The beef cattle breeds in the U.K. can be divided into two categories — the traditional British breeds (Angus, Hereford, Shorthorn etc.) and the Continental breeds (Charolais, Simmental, Limousin, Blonde d'Aquitaine etc.).

The British breeds, while suffering a big drop in popularity in the mid 1960's through breeding small, compact, early maturing animals and the importation of the Continental breeds, are beginning to regain much of their lost ground by breeding a larger, higher weight gaining and more efficient beef producing animal. While it is generally agreed that they are superior in their reproductive ability and adaptibility to extreme climatic and seasonal conditions their principal role is as a crossing bull with the dairy cow to produce a crossbred mother, with the male progeny a very saleable animal.

It was interesting to see the role some of the minor breeds like the Galloway and Highland cattle play in producing a very hardy, productive animal that will survive and reproduce where others will not.

The Continental breeds of cattle have had a big impact on the beef industry in Britain, and today represent a large proportion of all sires used. Their main role is as a terminal sire used on dairy and dairy cross cows. The main breed is the Charolais, with the Limousin and Blonde d'Aquitaine becoming more popular because of their superior carcass qualities.

It is generally recognised that the Continental breeds are superior as far as growth rate and carcass yield is concerned, their reproductive ability is poor. The British breeds have lacked the growth rate and carcass qualities but are far superior in reproductiveness. We now see great emphasis by breeders of both breeds to correct these defects and breed an animal with both high growth rate and carcass quality combined with good reproductive ability.

ARTIFICIAL INSEMINATION

A.I. is used extensively in Britain, with the majority of dairy cows being bred to A.I. Its use in the beef industry is limited to the stud herds, however it is important to the beef industry because a large percentage of the dairy cows are bred to pure beef bulls.

Semen collection and storage methods are advanced and effective with all work being done by large co-operatives and the MMB.

Insemination is done on a once daily basis, however some work is showing a 15 per cent higher conception by using a twice daily insemination.

Synchronisation of heat is common with heifers, while heat detection methods in Britain are mainly visual. In the large herds of France where A.I. is used it is now accepted that heifers treated with hormones are the most satisfactory teasers. Two are used in each mob for 21 days, spelled and replaced for 21 days, retreated and used for another 21 days.

Regulations governing the use of A.I. are strict with all Centres and Technicians registered. Some beef cattle breed societies have rules restricting the number of animals allowed to be registered to as low as 10 head.

Artificial insemination in Australia is advanced and there is little to be gained from Britain or France that can be of benefit to Australia.

EMBRYO TRANSPLANTS:

The development of both non-surgical recovery and transfer of embryo and the potential of them to be frozen is making the practice commercially acceptable.

Non-surgical recovery and surgical implant is the practice most commonly used. Live calf average of approximately 60 per cent.

Embryo freezing has yet to be perfected, with a 40 per cent live calf expectancy with current technique. The main problem is in thawing time.

Research being undertaken at Cambridge includes:

1. Cloning, the removal of the fertilised egg by micro-surgery and replacing it with an identical one, thus using one set of similar genes to produce identical animals.
2. Twinning, by splitting each fertilised egg to produce identical twins and doubling the production potential of the donor.
3. Breeding animals of more than two parents, selecting the desirable genes from different donors and fusing these together to breed an animal in one generation that would normally take several.

All of these have been successfully done using sheep.

Up to the present time all embryo transplant work has been done in clinics designed specifically for the job, however with the technique being perfected there is a trend to mobile clinics providing an on-farm service.

It is acknowledged that within the next decade Embryo Transplants will be perfected to the same degree as Artificial Insemination.

This will enable the export of frozen embryos all over the world as well as a more rapid improvement within herds through the more extensive use of the superior females within the herd.

GROWTH PROMOTANTS

The rate of growth of animals is affected by the balance of hormones in the body. This can be altered by the administration of natural or synthetic substances which when used correctly will increase liveweight gains by up to seven per cent. There are two types of growth promotants available commercially. They are:

1. Surgical Implants.
2. Feed Additives.

BULL BEEF

The advantages of leaving male calves entire is now obvious and beginning to be accepted by the trade and consumer.

Advantages:

1. A seven per cent increase in daily liveweight gain.
2. A five per cent increase in carcass yield.
3. Premium payment of 14 cents per kilogram.

The desirable weight for the trade is a 260 kg carcass. This is achieved at 12 to 15 months of age.

It is obvious that by not castrating male calves there are going to be management problems, however with the substantial financial benefit these can be overcome.

PROCESSING AND MARKETING (MEAT)

As in the United States of America there is a definite trend away from the traditional family butcher shop to the selling of meat through large supermarket chain stores in a pre-packed form. Twenty five per cent of all meat sold in Britain is now sold through the supermarket with this quantity increasing rapidly.

This change in meat retailing coupled with the results of market research done by the larger companies has forced changes in the processing side of the trade. It has been firmly established that the consumer requirement is for meat with a minimum amount of fat, of good colour and texture. Tenderness is very important with flavour of little importance.

The developments which are now coming through as a result of these trade requirements are:

1. Hot boning, removing the muscles intact without cutting across any muscles and leaving the skeleton hanging.
2. Vacuum packaging; whole joints are vacuum packed and the meat is aged in this way. Optimum aging time 14 days.
3. Electrical Stimulation. A process where the hot carcass receives an electric shock on passing through a steel box situated on the killing line. This shortens the muscles and:
   a. Tenderises the carcass
   b. Improves carcass colour
   c. Higher moisture retention
   d. Increased keeping quality
   e. A higher yielding carcass
4. Protein Beef. The injection of an enzyme into the live animal 20 minutes prior to slaughter. This breaks down the blood cells and tenderises the carcass.

Great care is taken in the presentation of pre-packed meat. Package size is small with the average size for a roast one kilogram and less than half a kilogram for grilling meat. All excess fat is removed and in many cases cooking instructions are included. The emphasis is on minimal waste and easy preparation.

Competition from alternative protein foods and white meat is strong, with beef sales showing a steady rise it is competing effectively with its competitors.

Abattoirs in Britain are small and hygiene requirements low compared to Australian standards. Industrial relations are excellent with a very good worker/management relationship at all levels.
There are vigorous meat promotion campaigns being carried out through extensive advertising by the large supermarkets to capture a greater share of what is obviously a lucrative market.

BREEDING RESEARCH AND DEVELOPMENT IN U.K.

A herd of 200 pure bred cattle has been established in Britain by the Animal Breeding Research Organisation (ABRO).
The main goal in the selection work is to test and select for the efficient production of lean meat using two selection lines. These are:

1. Selected for lean tissue growth rate.
2. Selected for lean tissue food conversion ration.
3. A genetic control pool.

In the selection line for the performance test is to 400 days of age. Lean growth is the 400 day weight multiplied by the estimated per cent lean at the end of test. The lean tissue feed conversion ratio is the feed eaten divided by the lean weight.
Genetic change through "lean tissue growth rate" is expected to lead to larger leaner cattle, and through "lean tissue feed conversion" to more efficient leaner cattle with no change in mature size.
Another objective in the project is to use embryo transfer to increase the rate of genetic change. Techniques with non-surgical recovery and insertion are currently being developed.
The project is also intended to get the research scientists in closer contact with the pedigree breeders and the problems associated with cattle breeding.
As well as the main selection theme other problems in beef cattle testing work are being studied. These are the value of ultrasonic in carcass assessment in bulls and 400 days versus 500 day end of test point in performance test.
There has been little animal breeding research with beef cattle in Britain so far, and the ABRO project has been started to try to remedy this deficiency.

GRAZING SYSTEMS AND GRASSLAND MANAGEMENT

The objectives of any grazing system are:

1. To grow the right amount of grass of adequate quality.
2. To ensure efficient utilisation.
3. To achieve good animal performance.

Key factors affecting output are:

1. **Choice of grass.** Successful beef and sheep systems can be run on permanent pasture with the pasture or grass variety less important than management in determining herbage quality. The highest grass quality and animal performance is obtained by not allowing growth for more than four to five weeks before grazing.
2. **Level of Fertiliser Use.** This is a major factor affecting grass productions with responses affected by soil type and rainfall. With the heavy use of fertiliser mineral and trace element level must be checked by soil or herbage analysis. In Britain there are many livestock abnormalities beginning to occur in stock grazed on highly fertilised pasture which are believed to be due to mineral or trace element deficiencies through excessive use of certain fertilisers. These abnormalities include staggers and joint defects, abnormal and premature calves being born and even some fertility problems.
3. **Density of Stocking.** Increasing stocking density in peak grass growing periods can increase output per hectare, however high stocking rates can lead to poorer individual performance and disease incidence can increase. Animal requirements can be made to fit grass growth more closely by:
   (a) Conservation of surplus grass
   (b) Adjustments in stocking rates
   (c) Supplementary feeding in periods of poor grass growth
4. **Disease Control.** Health problems in grazing animals are important because they reduce growth rates. The best control of intercal parasites is appropriate grazing management and planned dosing program. Avoid putting clean stock on infected pasture and dose before putting on to clean pasture.

Of all systems tried and used in Britain SET STOCKING has proved to be the best. It is simple and cheap, is a good system for large groups, it involves least disturbance of stock. But it is difficult to match stock requirements to grass growth and grass utilisation can be poor.

ROTATIONAL PADDOCK GRAZING which involves the permanent division of an area into small paddocks is flexible, allows easy assessment of grass available giving good grassland utilisation, can lead to reduced parasite infestation. But it is expensive for fences, gates and watering facilities and complex, requiring many management decisions. It is relatively unsuitable for large groups of animals.
Much work is currently being done on LIMITED GRAZING for cattle where stock are restricted to grazing pasture for only two hours per day, spending the rest of the time in yards with access to water and roughage, mainly straw. This system is mainly applicable to breeding and growing stock and has doubled the carrying capacity of pasture while maintaining body weight of stock. It requires intensive management, substantial, well drained holding yards and an ample supply of roughage.

FODDER CONSERVATION

Hay

The ability to bale, transport and stack hay rapidly is an essential part of any system that aims for high quality hay. The big bale technique enables a high rate of baling to be combined with ease of transport and suitability of the bales for barn drying. There are two basic balers used, they are the big square baler and the big round baler.

The big square bale is 2.4m. x 1.5m. x 1.5m. weighting 0.8 tonnes with a bale density of 106 kg/m^3. A baling rate of 12 tonnes per hour has been recorded. One man with a gripper foreloader and trailer can cart and stock these bales at six tonnes per hour. These bales are most suitable for barn drying.

Big round bales vary slightly with different machines but measure 1.5m. x 2m. weigh about the same as quare bales (0.8 tonnes). Handling of round bales is similar to square bales with a gripper foreloader. These bales are not suitable for barn drying but have the advantage of being able to be left in the paddock with little spoiling by weather, thus eliminating the need for transport and storage facilities.

Barn Drying

Barn drying makes it possible to bale and cart hay at up to 35 per cent moisture content. Big bales are normally dried in tunnels constructed in arches, with four or five arches. Each arch consisting of 11 big bales. This means that up to 55 bales can be dried in one batch.

The moisture extraction units used have an airflow rating of 16m^3/s at 500N/m^2.

Straw

There is increased interest in the utilisation of low quality roughage such as straw as a stock feed for production. Baled stubble is chopped and mixed with a slurry of molasses and soya bean meal and fed to cattle as a complete ration. The results appear promising and with the huge wastage of straw and stubble in the grain growing areas of Australia there is a potential for the harvesting and economic usage of this roughage for livestock production.

High Moisture Grain

The use of high moisture grain as a stock feed is increasing because of the higher food value of it. The main storage is in vacuum silo towers. Development is taking place on the treatment of high moisture grain, e.g. costic soda, which allows it to be stored in open sheds. The main disadvantage is that once rolled the grain loses food value, so must be used immediately.

GRAIN GROWING

Progress in the arable crop sector has been significant and rapid in Britain. The availability of increasingly powerful cultivating machinery, of improved varieties, sophisticated chemical treatments and improved handling, processing and storage facilities have all had an influence on the increase in production.

Modern chemical herbicides have facilitated the development of non-plough techniques in which seed is sown directly into uncultivated soil.

Cultivation Equipment

With a greater awareness of energy requirements of cultivation equipment considerable research has gone on during the past few years into the development of the "ROTADIGGER" which offers those on medium/heavy land a viable alternative to medium depth (200mm) drought cultivators. The basis of the Rotadigger is a low speed 0.76m. diameter rotor with L-shaped blades on flanges 240mm apart. A coarse tilth up to 150mm deep is produced by successive blades on a flange entering the soil every 250mm in the direction of travel. The considerable forward thrust so created is absorbed by chisel tines behind the rotor which are capable of cultivating to a depth of 300mm. The digger, which can draw 100 per cent of its power from the tractor, is more efficient in fuel use than comparable drought implements and provides a work rate similar to one or two passes of a chisel plough.

Direct Drilling

The main economic advantage to the farmer using direct drilling lies in maximising the area planted at any one time. The heavy clay soils, which are hard to manage, seem to respond very well to direct drilling. These soils are usually poorly drained (naturally) and remain very wet and impossible to prepare a seed bed in a short time. The sandy soils are not suited to direct drilling because the sand particles compact very easily with no natural shrinking and expansion.

Removal of straw is important. This is usually burnt for several reasons:

1. mechanical operation of the drill
2. harbouring of slugs
3. continuation of diseases
4. possibility under anerorobic conditions of release of acetic acid which inhibits germination.

By direct drilling soil structure is improved, due to the fact that you are not destroying the old root channels, earth worm holes and not farming a plough layer to restrict water movement. Spraying before and after seeding is critical. There are several types of drills that are used but main ones are the triple disc, single disc and tyne drills. No one drill is the answer for all soil conditions and considerable work is required to develop a more effective machine. Tynes seem to be better than discs in soils which are on the wet or dry side of optimum moisture levels. If straw is left none of the commercially available drills are adequate to give a good seeding job. The disc drills, if used in wet conditions, will smear the edge of the slot instead of cutting cleanly. This does not

allow the water to escape and may even block the root from penetrating the soil. It seems that in the first years of direct drilling extra nitrogen will be required with the seed. The organic matter that is left requires Nitrogen for breakdown.
On work done in Britain on direct drilling it has shown that direct drilling has a $20 per hectare cost advantage over conventional farming, with yields almost identical, the saving is in ploughing costs. With the obvious cost savings of direct drilling much work is needed to design direct drills for fast and accurate work and in the controlling of some weeds.

Tram Lining

To avoid crop damage and ensure accurate coverage of crops during spraying the practice of tram lining at sowing is common and advantageous. This entails the blocking off of the planting rows on the seed drill to correspond to the wheel track at intervals to coincide with the width of spray equipment to be used.

Spray Application

With the escalating cost of chemicals and the increased awareness of the dangers associated with spray drift, much work is being done to develop better methods of application. The two in the pipeline at present are:

1. The Controlled Droplet Application
2. "Electro-dyne" spraying system which is the electronic spraying of chemical charged positive to the plant which are negative.

FARM MANAGEMENT

Before looking at farm management practices in the U.K. it is important to appreciate the structure of these operations. The financial return for the various comodities is reasonably predictable, the seasonal conditions are reliable and labour is relatively cheap.

* Farm managers on a whole are a higher academic qualification and have a greater understanding of business principals than their counterparts in Australia.
* Farm managers are less involved in the physical side of running a farm. the majority of their time is spent in the office making decisions.

Computers

The most significant development in farm management is the use of on-farm computers. These offer a wide range of options for the farmer and being promoted commercially. With the cost coming down and the increase in firms being involved in servicing and programming, farm computers have a huge potential as an aid to better rural management in Australia. The current basic cost of an on-farm unit is approximately $3,000. Operating costs estimated at $60 per week. Their uses include:

1. Keeping of all financial records. Up to date cash flow and bank balance, prepares budgets etc.
2. Complete paddock history. Records of previous crops, yields, sprays and fertilisers. Costs and margins.
3. Complete livestock history. Performance records etc.

Advisory Services

Farm managers take every advantage of the advisory services available to him. There are new avenues opening up with the use of video tape through television. There are phone in services for market intelligence, seed varieties and chemical treatment etc.
Extension officers are actively involved taking the latest in research to the farmer, but offering considerable advice on financial management.

FARM ORGANISATION

While the farmers in the U.K. represent only three per cent of the total population they are represented by a single organisation, the National Farmers Union, which is regarded as the most powerful political lobby in the country.
The N.F.U. represents every section of farming from livestock to grain, fish farming to cut flowers.
It is a voluntary non-party political organisation group of employers with an annual budget of $14 million.
The basic philosophy of the N.F.U. is NOT TO REPRESENT INDIVIDUALS BUT TO PROVIDE A CLIMATE FOR AN INDUSTRY TO PROSPER.
Highly professional staff are employed with a fairly big emphasis on Public Relations. This includes the production of a documentary film each year aimed at the consumer.
Publications directed to:

1. Members of Parliament
2. Teaching Profession
3. Consumers
4. To counter bad legislation

Animal Welfare groups.
Public relations officers are stationed strategically throughout the country to keep local news pro-farmer.
A phone in service for the press to professional up to date farming news.
Training of all Branch officials in media presentation.
A PARLIAMENTARY LOBBY headed by two full time lobbyists backed by five lawyers is actively engaged to influence legislation before bills are drafted.
The ECONOMICS DIVISION headed by nine economists monitor movements in costs and prices and maintain up to date profitability studies for commodities.
After looking at the mechanics of the N.F.U., and seeing how effectively one organisation can represent ALL

sections of farming, there are three basic guide lines essential to the restructuring of the farmer organisations of Australia.

1. It must be professional and must have a budget that permits it to be run by professionals.
2. That each section of farming must retain its full autonomy.
3. That all sections must come under one final umbrella of power for strength and unity.

THE E.E.C. AND AGRICULTURAL POLICIES OF BRITAIN

by David G. Raff, "Fores", Karara, Queensland
Nuffield Farming Scholar 1980

The fortunes of agriculture in Britain, like all other countries throughout the world, is to a very large extent determined by the politics and agricultural policies of the country.

While production suffered long depression between the two world wars which reached its lowest point about 1930, the extent to which agricultural activity had declined became more apparent with the outbreak of war in 1939. Then in 1947, still shaken by the aftermath of the war and the realisation by the Government that the number one requirement to get a country going was food, it took on a complete revolution with the signing of the Treaty of Rome which laid down objectives for the Common Agricultural Policy. The aims of CAP were:

1. To increase agricultural productivity.
2. To ensure a fair standard of living for the agricultural community.
3. To stabilise markets.
4. To assure the availability of supplies.
5. To ensure that these reach consumers at reasonable prices.

In the early 1950's agriculture represented only a small part of the budget's financial stake but having well over 20 per cent of the working population of the six engaged in agriculture. Today the position is reversed with agriculture representing 75 per cent of the total budget with less than 10 per cent of the working population producing it, with only two and a half per cent of the population of Britain engaged in agriculture.

How far has CAP gone in achieving its objectives?

The first was to increase production. Over the years farmers have been encouraged to increase production through the payment of massive financial incentives. These include capital improvement grants and livestock subsidies which have been paid to farmers to not only keep them viable but to increase production through a high input system.

To a large extent these production goals have nearly been achieved.

Next was to ensure a fair standard of living for the agricultural community — this was done by the massive financial incentive given to increase production.

The stabilising of markets is also being achieved through the huge increases in production.

Coming now to the final aim of CAP which stated that supplies reach consumers at reasonable prices, it is obvious that this has not been done. Food prices in E.E.C. countries are now amongst the highest in the world with Germany having the dearest and Britain closely following in second.

There are now signs of a strong awareness by the consumers of the fact that they are paying dearly for their food.

With the major objectives of the aims of CAP nearly satisfied but at a high cost to the consumer, it is interesting to look closely at what the likely developments are for the future from both the producers and consumers point of view.

Many of the agricultural commodities have reached production figures which are capable of supplying all the community requirements and the possibility of surpluses inevitable. The question one must ask is what is going to happen to those surpluses if and when they appear, or how is production going to be curbed to prevent an over supply.

This is probably the biggest single factor that the commission has to face up to and the signs are there that there are going to be difficult times ahead for the farmers, particularly in Britain.

The British farmer is geared to a very high input, high output operation with huge financial commitments to achieve maximum production. Inflation running at 20 per cent and interest rates at 19 per cent he is looking for high increases in prices to service these commitments.

However, with the pressure coming from the consumer, through their increasing awareness of the fact that they have the most expensive food in the world, not to pay any more for food the Governments are becoming reluctant to maintain their present financial support. It is this pressure on the farmer which the bureaucrats in Brussels hope will curb production — it will leave the farmer with no alternative but to reduce inputs and be content with a lower output.

But whether the farmers will accept this remains to be seen, as even with their diminishing numerical strength they remain a powerful political force and the fact remains that the Governments are still basically sympathetic to the farmer.

Now we see the other major problem; if production is not curbed what will happen to the surpluses? This I feel is the one aspect which must concern third world countries like Australia.

With the high input high cost system of producing food within the E.E.C., they now produce agricultural products that are in no way able to compete on the world market. If they have to dispose of surplus agricultural

products on the world market they will have to be dumped onto the market at greatly reduced prices, thus jeopardising markets already held by free trading countries like Australia.
Turning now to the future of agriculture in Britain, I see the farming industry in this country entering a period similar to that which we in Australia experienced in the mid-1970's. With high inflation, bank interest rates up and the money supply tight, coupled with the prospect of an over supply in certain commodities, also the less sympathetic attitude of the Government, farmers in Britain can expect little joy in the next few years.
As far as countries like Australia, who have limited markets for agricultural products into the E.E.C., the message is clear that we must fight hard to hold these markets as the farmers are determined to restrict imports.
One encouraging note came from the Minister for Agriculture, Peter Walker, when addressing an N.F.U. council meeting. He was questioned about imports of agricultural products from New Zealand and gave an emphatic reply that Britiain had a moral and political obligation to its allies like Australia and New Zealand and was not prepared to place these allies in jeopardy.
In summing up it must be accepted that for most agricultural commodities there will be free trade between Britain and the other member countries of the E.E.C. while imports from third world countries will be subject to import tariffs.

SUMMARY

Farming in Australia is carried out in an environment of fluctuations and uncertainties which are both unpredictable and beyond the control of the farmer.
The seasonal conditions are variable from the extremities of drought and flood, the markets are fluctuating and unpredictable because of the dependence on an export market and agricultural politics and policies are generally unstable.
The farmer has, therefore, if he is to survive, take whatever steps possible to soften the blow of all these unpredictable fluctuations and endeavour to level out the peaks and fill in the troughs.
Today we are living in a world of rapid technological advance, a world whose population is expanding at an increasing pace and one where the land used to produce food is being slowly taken over for urban development. Land all over the world is at a premium, and we are fortunate in Australia to have plenty of it. The agricultural production potential of Australia is tremendous with the only limiting factor being the financial incentive and certainty of a return for the product.
Because of the vastness of agricultural land in Australia and its relatively low cost per acre on world standards there is a growing interest overseas in this country and all indications are that there will be large foreign investment into land in Australia. It is therefore important that the farming community and Governments are aware of the implications this could have and ensure that guidelines are set down to not only protect our national resources but those already involved in farming and the future generation Australians who choose farming as a career. The value of land in Britain and the Continent is at a price now which bears no relationship to return on capital and it is virtually impossible for anyone not already involved in farming to buy a farm.
On the production side of farming there are ways and means whereby the farmer can perhaps better utilise those resources he already has at his disposal. He must make better use of the good seasons and conserve more fodder and water to soften the blow of drought. There are big developments in fodder conservation, the big baler which enables hay to be baled and transported rapidly, the big round bale which can be left in the paddock with minimum weather damage, there is protein and mineral treatment of low food value roughage such as stubble which can now be fed for production as well as the more efficient grazing of pasture.
The beef producer must pay more attention to the trade and consumer requirements, for too long he has produced an article which he believed was what the consumer wanted. There are alternatives to red meat, which is being marketed increasingly through supermarkets in a pre-packed form, it has to compete with white meat and substitutes. The consumer wants tender red meat, free from fat and waste, the retailer wants a carcass that yields a maximum amount of red meat and an article that is consistent.
The fattener wants maximum profit, to get this he wants a high weight gaining animal that puts on red meat not fat. The commercial breeder wants maximum profit, to achieve this he wants the maximum number of calves and a fast growing calf to give maximum weight for age. It is the responsibility of the stud breeder to produce breeding stock to supply these markets, to produce an animal of the highest reproductive ability with the ability to grow fast and produce a high yielding carcass. For too long the stud breeder has concentrated on the fads and fashions of the show ring at the expense of the important commercial qualities of an animal. There are ways of measuring these important traits and with the use of performance testing the stud breeder can make a greater contribution to the industry. Probably the most important aspect of the beef industry is to recognise the difference between fat and muscle on a live animal, the old ideal animal which looked something like a box on four legs, an animal with a deep flank and well filled plates has gone, today the animal should have a rounded shape with predominant muscle development, in fact, look something like a Landrace pig.
The importance of efficient farm management with a good business sense is essential. There will be an increasing need for farm managers to have a greater training in business management. The computer offers an unlimited potential to assist the farmer and it is important that they take advantage of this.
People involved in farming throughout the world are becoming less in number, farms are becoming more and more mechanised, but production is increasing. With fewer people directly involved in farming their political strength will diminish, therefore it is vital that farmers become organised and become involved in not only the production of a commodity but also the marketing of it. For too long the farmer has produced an article, sold it to whoever wants it at whatever price he can get and then forgotten about it. For too long he has depended on others to market his product. He must take a greater interest in his product after it leaves the farm gate and ensure that it is marketed effectively. To do this effectively he must have a strong united single farmer organisation to represent him.

AUSTRALIAN NUFFIELD FARMING SCHOLARS ASSOCIATION

PLEASE COMPLETE AND RETURN NO LATER THAN MONDAY, 8 APRIL, 1996

Surname: RAFF

Initials: D. G

Name by which you are usually known: DAVID

Degrees, prof. affiliation, honours, etc:

Name of spouse: JILL

Address: (if possible not more than four lines including postcode)

"FORRES"
P.O. Box 186
PITTSWORTH
Q **Post code** 4356

Telephone/Facsimile numbers you are happy to publish in the Directory:

Business: ( )
Home: (076) 932185
Car: ( )
Mobile: (015) 13 11 30
Fax: (076) 932 183

Subject of your study: Beef Cattle

Countries visited: U.K. & France

Current business or employment: (not more than 30 words)

Cattle breeding - Performance recorded Angus (Black & Red) & Texel Sheep.

Off farm involvement in the industry and community: (not more than 30 words)

Local Government - Deputy Mayor of Pittsworth

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