
Exotic Sheep

**. . . will they benefit the
New Zealand Meat Industry?**

WILL EXOTIC SHEEP BENEFIT THE N.Z. MEAT INDUSTRY?

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PREFACE

In selecting the topic of Exotic Sheep for my project I was aware that the N.Z. Meat Industry itself was a huge subject to be covered. Sheep are but a part of the N.Z. Meat Industry, but along with Beef, Pigs and Deer, they form an important base of raw material.

There is no doubt that the N.Z. Meat Industry finds itself under great pressure at this time (1988), even though it has survived the last 106 years since its inception. The industry is essentially export driven, and is facing enormous competition from overseas producers, many of whom are heavily subsidised and have the market at their backdoors. The Meat Industry supplies over 100 different markets and is expected to deliver quality and service, second to none. Consumers are becoming increasingly sophisticated, and if they can not get the right product at the right price, they will go elsewhere.

The N.Z. Meat Industry will survive the present crisis by adapting and improving its performance in processing and marketing, and by taking advantage of economic conditions as they improve. It has also become apparent that the quality of livestock, particularly lamb, does not measure up to market expectations, and will have to be improved. Buyers want our lamb to be better muscled in the leg and loin, while still retaining acceptable lean standards. It must yield a higher percentage of lean meat, and be of a high eating quality.

The purpose of this project is to evaluate exotic sheep that have been introduced into N.Z, and to see if they can benefit the Meat Industry by lifting the quality of our lamb carcasses. I will give background information on the development of the Sheep and the Meat Industry to date. I will also outline market requirements. I plan to give points of view, both for and against the importation of exotic sheep. Some trial work on breed comparison has been done in the U.K. and in N.Z, and I will interpret the results obtained, and with luck, reach an unbiased conclusion.

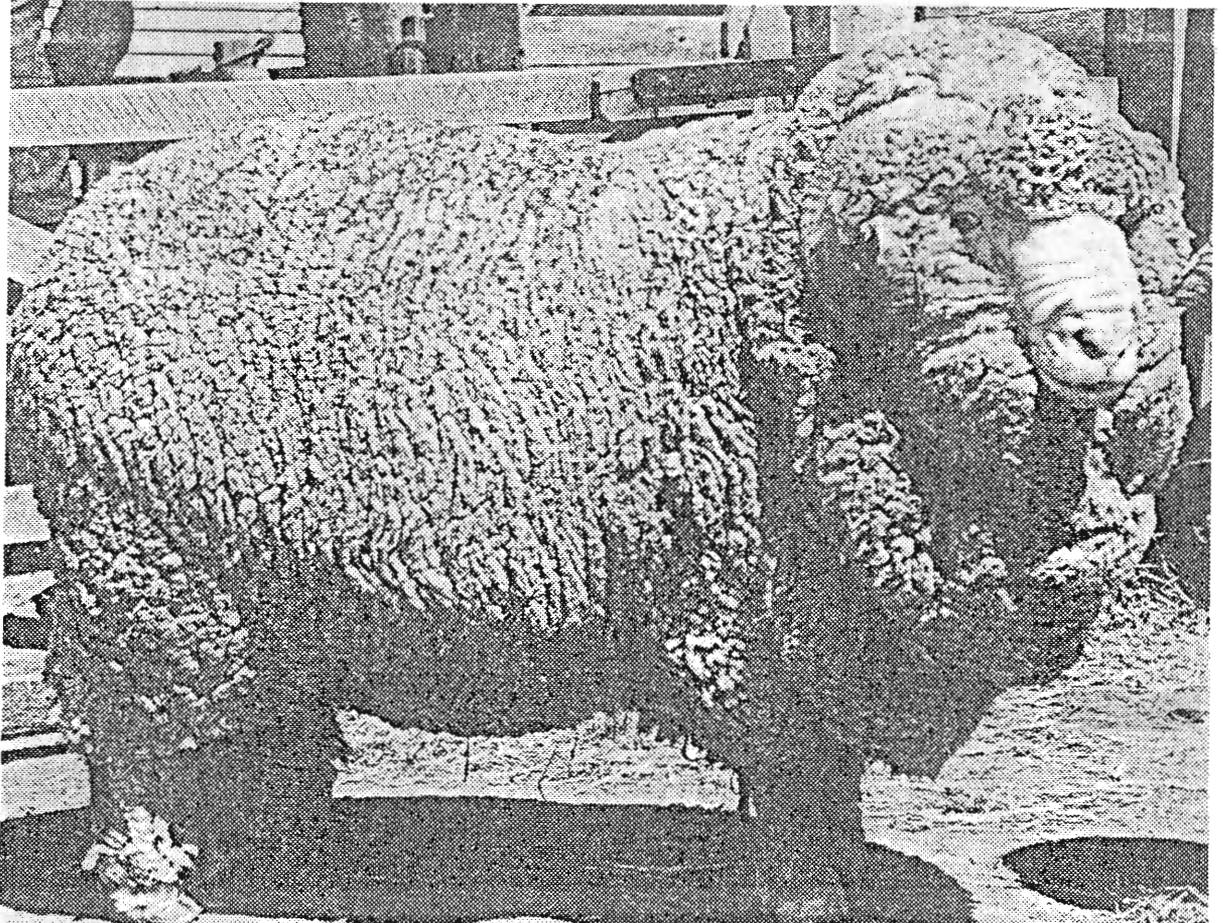
I MIGHT SELL THEM AS..ER..
ECONOMICAL, POLLUTION
FREE, SELF-PROPELLING
LAWN MOWERS...!



BACKGROUND OF N.Z. SHEEP INDUSTRY

In 1832, John Bell Wright laid the foundation of N.Z.'s national flock by importing 102 Merinos from Sydney. He established his small flock on Mana Island, and from that day on a steady growth in sheep numbers took place. N.Z.'s total sheep population rose to 200,000 by 1851, and stood at 1 m in 1857.

At about this time, other breeds were imported which included the Southdown, English Leicester, Cheviot, Romney Marsh and Border Leicester. Merino bloodlines were also extended with importations from England and Scotland.



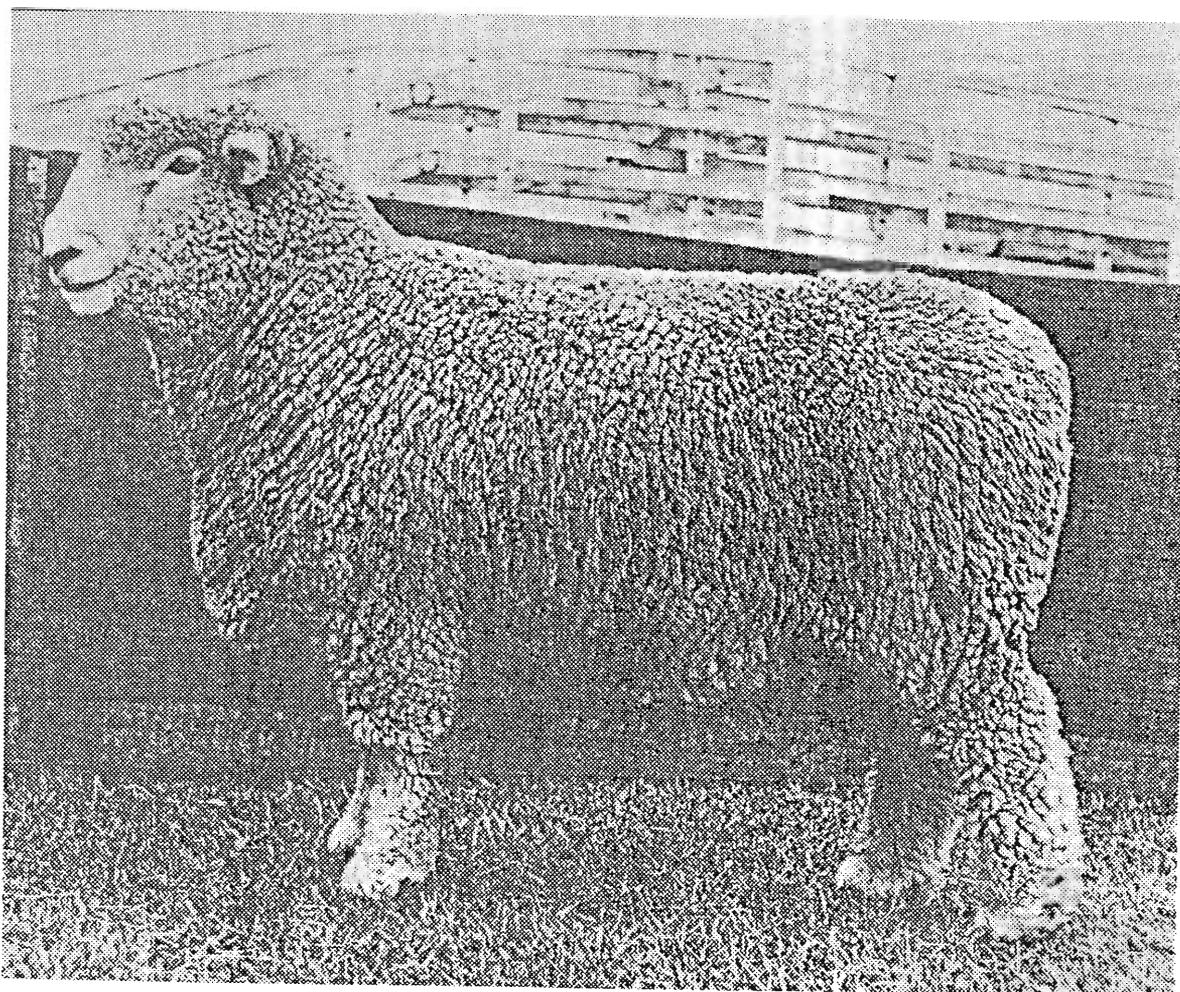
MERINO

By 1871, the total population stood at 10 m. An interesting feature of the sheep industry at this stage, is that it was based almost entirely on wool production, with the Merino being the dominant breed.

In 1892, the sheep industry began to change, as agriculture in N.Z. went through a development phase. Land was subdivided and 7 m acres of highly fertile plains and marshlands were converted from native scrub to English pasture. As a consequence of this development, the Merino lost favour on the better land and numbers fell to 1/3 of the national flock. Total sheep numbers then were 18 m of which 6 m were Merinos.

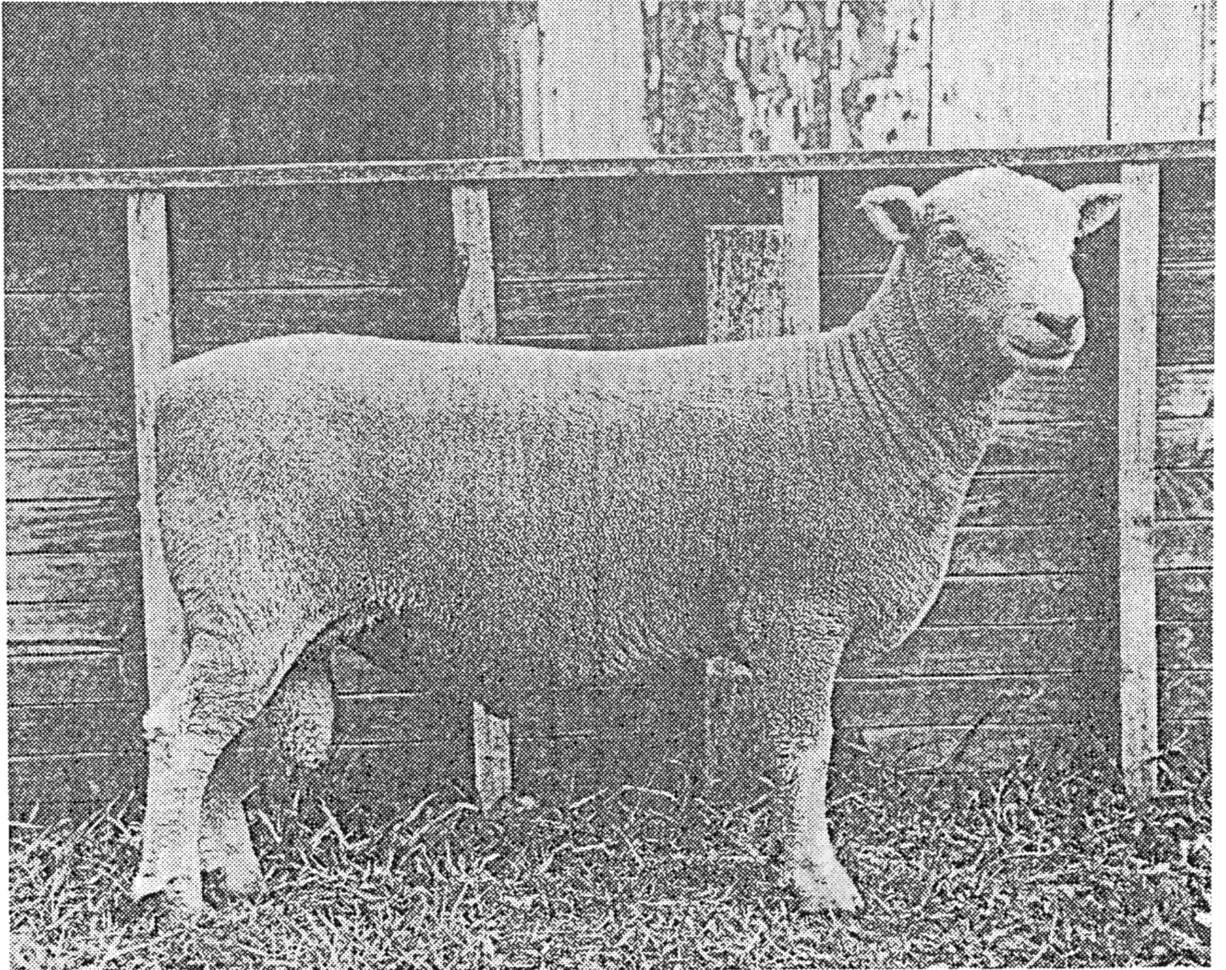
The Refrigerated Meat Industry contributed to the displacement of the Merinos as their small lean carcasses could not compete with the larger carcasses of the Romney and Border Leicester types. Crossbreeding became popular with the intention of making sheep dual-purpose (meat and wool) .

In the early 1900's, Romneys became the dominant breed. At about this time the term Romney X B (crossbred) came into vogue, as a consequence of the crossbreeding which had been taking place using the Romney Marsh to grade up. To this day the term still applies, and is often used to describe a wool type.



ROMNEY

The Southdown breed increased in popularity with the advent of the Meat Industry, and by 1925 became the second most popular breed next to the Romney. The Southdown was used as a terminal sire, and its early maturing progeny was much sought after on the London market because of its small carcass and fine grained meat. The conformation and eating quality of Southdown cross lambs became legendary and contributed greatly to the developing meat trade in the years ahead.



SOUTHDOWN

Sheep numbers continued to increase:

1911	-	24	m
1960	-	47	m
1967	-	60	m
1986	-	71	m
1987	-	64	m

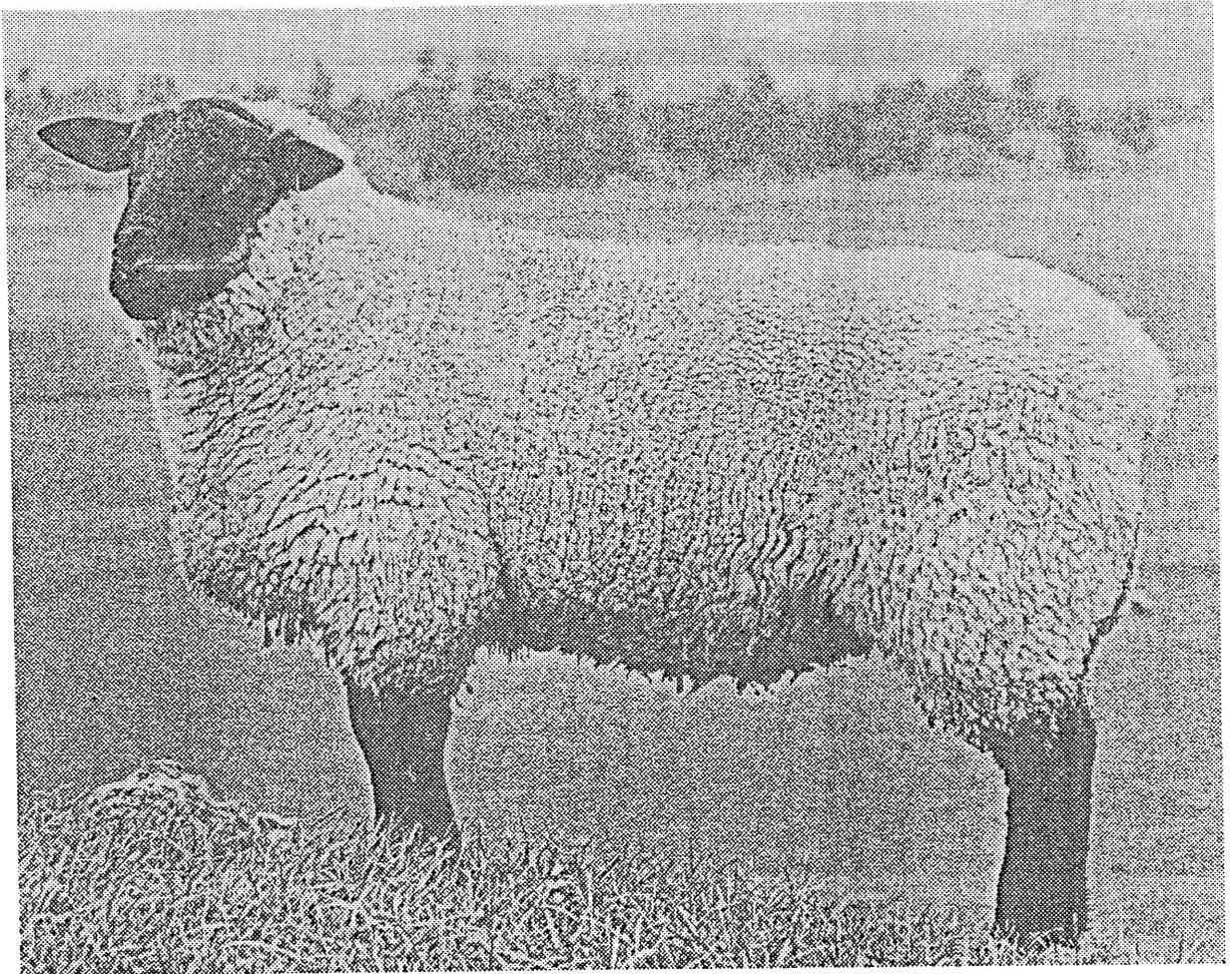
Breed changes since 1900 have been confined to the introduction of new dam breeds, graded up from a variation of existing breeds.

Breeds such as the Corredale, Coopworth, Perendale and Drysdale have been successfully introduced but the Romney is still number one.



DRYSDALE

In the last 20 years, the Southdown has lost favour as a terminal sire, as the market became more fat conscious. Other terminal sires, both black and white faced, have taken over from the Southdown as breeders have tried to breed a heavier and leaner type of carcass.



SUFFOLK

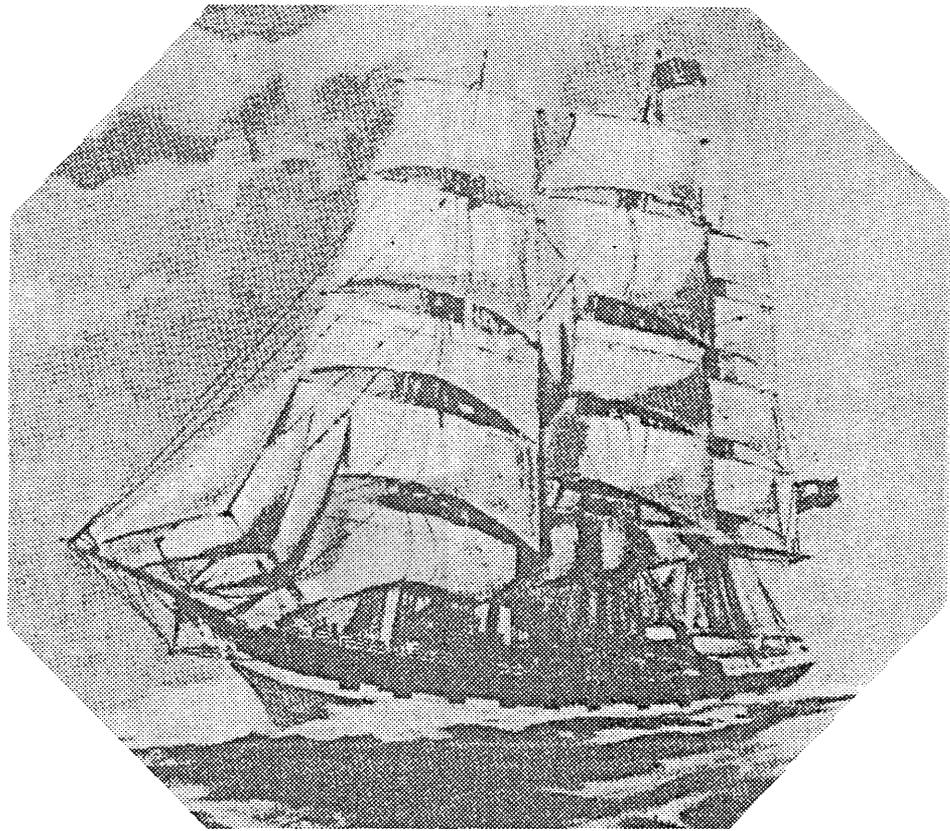
The N.Z. Sheep Industry has gone through three different stages. From 1832 to 1882, it was based on all wool. From 1882 to 1970's it became dual purpose, with meat being an important income earner.

From the 1970's to the present day 1988, wool has assumed more importance.

It is this last trend that is causing some problems in the meat industry, as some of the wool breed lambs do not have the conformation that is required by the consumer.

EARLY DAYS OF THE REFRIGERATED MEAT INDUSTRY

On the 15th February 1882, the barque-rigged sailing ship "Dunedin" left Port Chalmers on a voyage that founded a national industry. The Dunedin carried N.Z.'s first shipment of frozen meat which was a fore-runner of many to come, and usshered in a new era, both politically and economically for this country.



THE DUNEDIN

Credit for this technological breakthrough must go to William Soltau Davidson and Thomas Brydone of the N.Z. and Australian Land Company. They had observed developments in refrigeration that had taken place in France, and following a successful trial shipment from Australia to England in 1880, they became convinced that it was feasible for N.Z.

The Australian and N.Z. Land Company entered into an agreement with the Shaw Savill and Albion Company to fit up the Dunedin with refrigeration equipment. The shipping company agreed to a freight rate of 2 1/4 d. a pound, and after a journey lasting 98 days the first cargo arrived in London. It was found that the cargo of 4311 sheep and 598 lambs were all in first class order.

Some idea of the economic gain to the Australian and N.Z. Land Company can be seen from the fact that the sale in London returned 3 1/4 d. a pound for both mutton and lamb. After paying the cost of killing and putting on board in N.Z., the Company netted £1/1/9 3/4 per sheep. This compared with a value of 11/- to 12/- per sheep on the local market at the time of shipping, so the value was about doubled.

The development of refrigerated meat lifted the N.Z. Sheep Industry out of the doldrums, and put it on a positive growth path for many years to come. In a way, it typifies the sort of breakthrough that is now required to secure the future of the industry today, and take it into the twentyfirst century.

DEVELOPMENT OF THE MEAT PROCESSING INDUSTRY

N.Z.'s first slaughterhouse was erected by the Australian and N.Z. Land Company on the Totara Estate just south of Oamaru. Compared to today's plants, the Totara slaughterhouse was very basic, with no freezing facilities. Six solo butchers with attendants were employed and a daily tally of 240 was attained.

After allowing the carcasses to hang for 24 hours, they were then despatched to Dunedin by train, in vans specially fitted with hanging rails, ventilators and ice chests. The idea was to have the ship act as freezing works and frozen store. The principle worked well but it took a month to get the ship loaded.

Following the first shipment of frozen meat, several more sailing ships were fitted with refrigeration equipment and entered the trade. They were followed by steamers that could transport larger cargoes in a shorter time than the sailing ships.

The frozen meat industry grew immensely. Ten years after, the Dunedin's first voyage, 21 freezing works were in operation, exporting 2 m sheep and lamb carcasses worth over 1 m annually.

However it was at this time that the industry struck its first crisis:

Lamb sold on the London market for 3 d per lb.

Mutton sold on the London market for 2 1/2 per lb.

The total cost of killing, freezing, freight and selling was 3 d per lb, which made the industry uneconomic.

After consultation, all parties involved agreed to reduced charges, which lowered the total cost from 3d per lb to 2 d per lb. This left a margin of 1 d to 1 1/2 d per lb, which allowed the trade to continue. Costs were reduced still further in the years ahead, and prices obtained on the London market improved.

By 1911 the number of freezing works reached 31.

By 1920 the number of freezing works reached 43.

By 1987 the number of freezing works reached 54.

Meat Export receipts in 1883 totalled £ 118,000.

Meat Export receipts in 1987 totalled \$2,262.7 million.

MARKET DEVELOPMENT

The Industry has enjoyed a steady growth from its early beginnings until 1985-1988 when numbers of stock slaughtered began to decline. Various marketing crisis have occurred over the years, including periods before and after World War I and II. During the wartime, product was in short supply due to the number of ship sinkings.

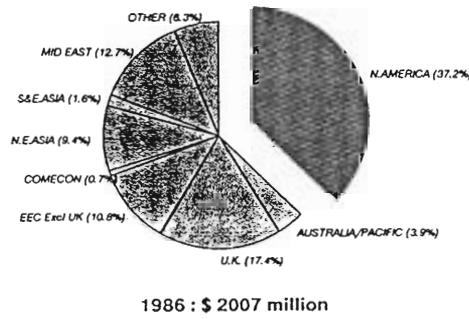
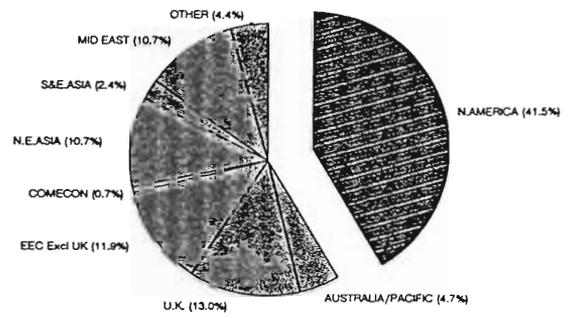
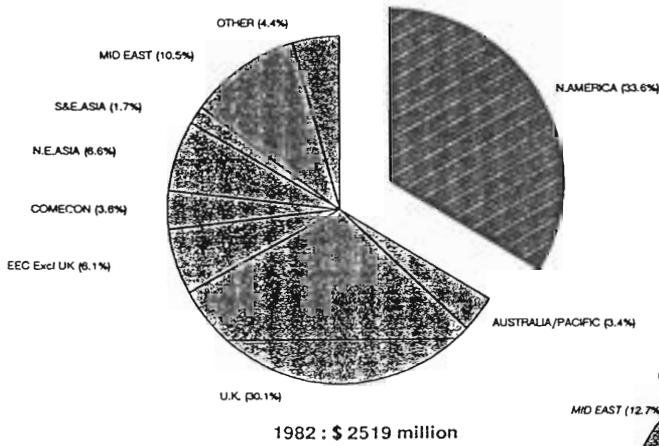
In 1922 the Meat Export Control Act was passed and the N.Z. Meat Producers Board was also formed. The Board began work by arranging freight contracts and shipping schedules, as it was felt that regularity and continuity of supplies was important from a marketing point of view. Over 90% of our product went to the U.K. market up until 1966, which made the industry vulnerable to any political, industrial or trade disruptions.

1965-1966 marked the beginning of the Common Market era, and N.Z. faced the prospect of seeing its market to Great Britain become restricted. At that time N.Z. was sending 260,000 tons of lamb to the U.K. and only 15,000 tons elsewhere. It was a crisis situation that demanded immediate action and a 10% diversification goal was agreed on.

The diversification programme has been successful to the extent that 110,000 tonnes now goes to the U.K. out of a total of 386,000 tonnes. Middle Eastern Countries are the biggest market, taking 135,000 tonnes.

The main markets for lambs are as follows: (1987 figures)

Britain	110,733 tonnes
Iran	110,732 tonnes
Japan	19,481 tonnes
Peru	26,193 tonnes
Canada	8,037 tonnes
Greece	8,524 tonnes
Saudi Arabia	9,502 tonnes



MARKET DISTRIBUTION : MEAT

Constant 1986 \$ million

INDUSTRY STATISTICS AS AT 1987

Number of employees	26,000 approx
Number of meat processing plants	54
Number of packing houses	18
Meat exporting ports	12
Lambs slaughtered	31,658.4 m
Sheep slaughtered	9,302.3 m
Cattle slaughtered	2,32 m
Calves and Weaners	.861 m
Pigs	.774 m
Total Export Earnings	2,264.0 m

Meat processing plants in New Zealand

Key to symbols

Meat processing plant ■

Meat packing house ●

Meat exporting port (Tonnes Shipped) 🚢



TECHNOLOGY

Apart from the initial discovery of freezing meat as a way to keep product during transport to the market, technology gains have been slow in developing.

Slaughter houses converted from the solo butcher system to the chain system in 1932. This allowed greater productivity from (less skilled) workers, but it also made plants more vulnerable to industrial disruption. The introduction of the killing chain allowed a gradual change to further mechanisation. In latter years such things as Automatic stunners, Automatic spreaders, Automatic trotter removers, Automatic pelters, Automatic cutters and Automatic weighing and ticketing machines have been installed. The Fortex plant at Ashburton was the first to introduce shiftwork to the killing chain.

Unfortunately the introduction of new technology has not come easily, and the industry has paid a heavy price in industrial disruption. Another cost that the industry had to bear was the rigid hygiene requirements that were imposed by the EEC.

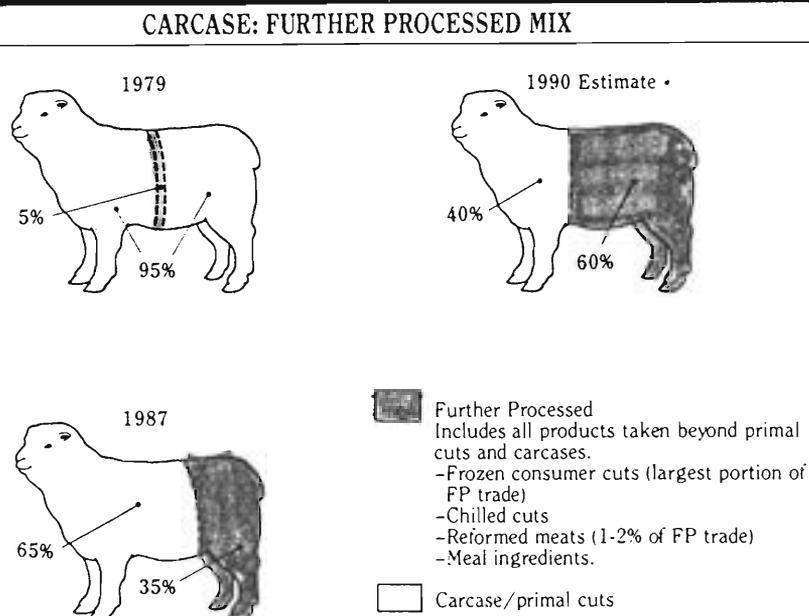
However, despite all of this, the modern killing chain has developed to the stage where 37 to 44 men can slaughter 3,500 lambs in an 8 hour day.

FURTHER PROCESSING TECHNOLOGY

Further processing has been undertaken by most Meat Companies to add value and push up returns. The advantages of further processing also include more off season use of plant facilities and a greater variety of product to stimulate market interest.

Adding value by further processing also increases cost and increases risk. Costs of value-adding have to be recovered in higher priced markets that are willing to pay the extra.

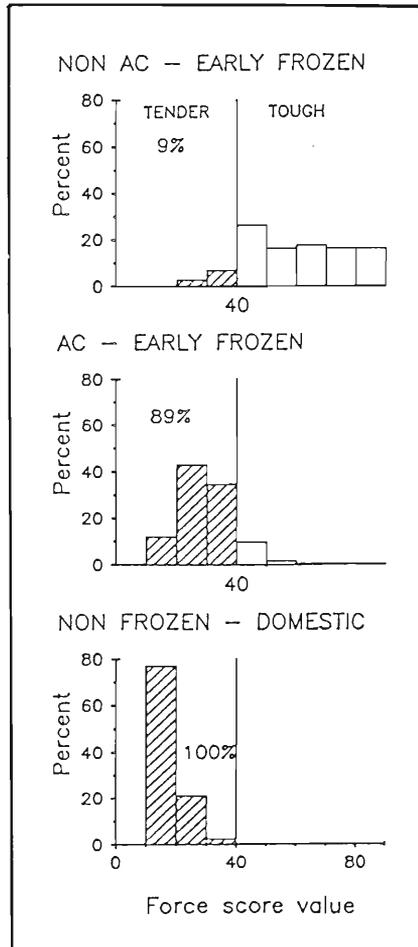
The Bulk of Further Processing is in the form of frozen Primal and Consumer ready cuts, followed by chilled cuts and reformed meat products. The remainder of the kill, the carcass commodity trade, is broken down and cut up as required at market destination.



A new development has occurred with a N.Z. Company, P.P.C.S., buying a half share in a British meat cutting plant, Barry Brooks of Norwich. The advantages of this move are that P.P.C.S. has a ready market outlet for its product, and it can process according to market preference at the time. The plant employs state of the art technology, uses 100% N.Z. lamb, and quality control is kept to a high level.

Accelerated conditioning is a process of electrical stimulation that prevents cold induced toughening of freshly

killed carcasses, where they are exposed to chill or freezing temperatures. This process which has been available for 10 years can be taken a stage further by delaying freezing for 8 hours to give a product of highly desirable tenderness. The process is known as accelerated conditioning and aging, or AC & A.



Most of N.Z.'s lamb has been exported in frozen form until now, with chilled lamb accounting for only about 1% of the total. This has been due to the relatively short shelf life of the product, not allowing shipment by sea to distant markets.

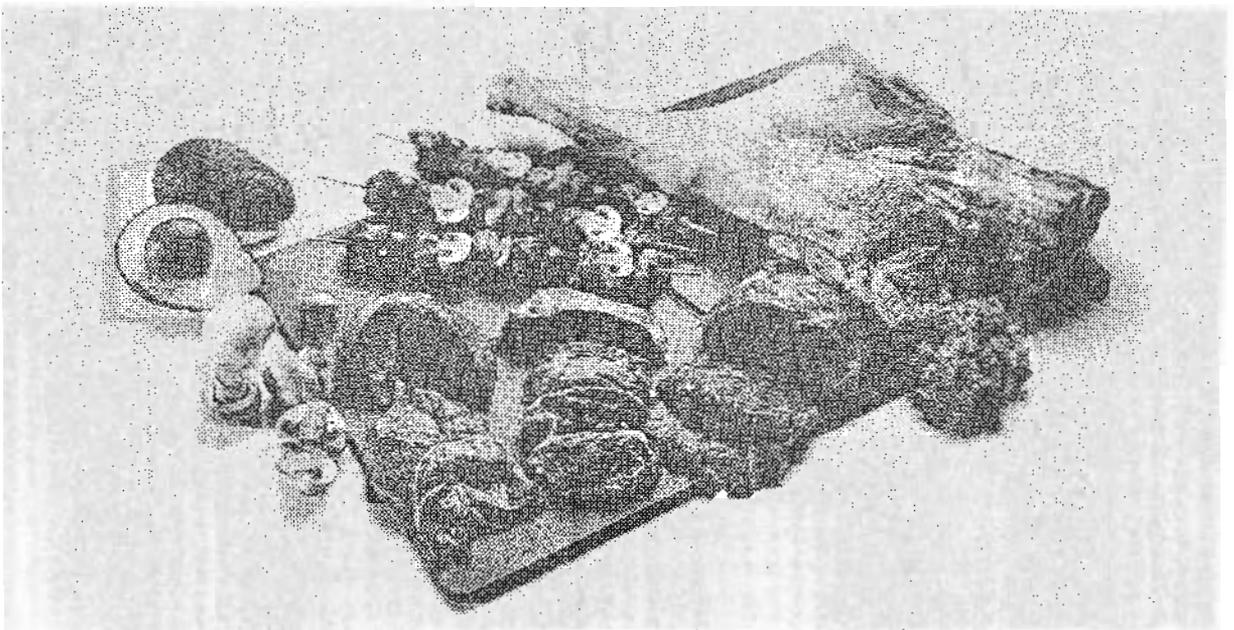
Recently a major technological breakthrough has occurred with the development of a packaging system that extends the storage life of chilled lamb to 16 weeks. Known as the CAPTECH system, it involves an aluminium foil-laminate outer bag flushed with CO₂ to remove all oxygen. This in turn reduces the rate of bacterial spoilage so that once the bag is opened the meat has excellent colour, and has the display of freshly killed product. The system is suitable for whole lamb carcasses, primal cuts and consumer ready packages.

Apart from extending storage life, the system results in a very high and consistent level of tenderness. The significance of this system is that there are no processing limitations in producing an acceptable product; but the end product will only be as good as the lamb that is used to produce it.

MARKET REQUIREMENTS

As a general rule, N.Z.'s lamb markets have become more demanding in terms of product specifications. This applies to carcasses, primal cuts, consumer ready cuts, both chilled and frozen.

The modern meat-eater is more health and diet conscious than in the past, and is looking for a product that yields more lean red meat with less fat and bone.



From a marketing point of view the supermarket shopper is attracted to a product that has:

- freshness
- eye appeal
- leanness
- tenderness
- juiciness
- colour
- consistency of quality
- versatility
- convenience
- novelty packaging
- availability
- brand labelling which includes recipes and nutrient content.

I know the above list of requirements sounds quite formidable and yet all of the qualities mentioned can be provided with known technology and marketing techniques.

While further processing can trim excess fat from various cuts, it is both time consuming, wasteful and costly. It must also be remembered that further processing can not improve the depth of muscle in the leg and the loin.

The key factor in satisfying market requirements is of course to supply a lamb with good conformation that has a high (lean meat) to (bone and fat) ratio yield in the first place. This applies to most weight ranges and most markets.

LAMB GRADING SYSTEM

GR MEASUREMENT SITE

For both the lamb and mutton grading systems, the method of assessing fatness is by making a manual assessment of the thickness of tissue at a specific point over the ribs known as the GR measurement site.

The GR measurement site has been shown to be a good indicator of the fatness and in turn, the lean content of a carcass. However, it must be emphasised that the use of this measurement is as a basic reference point.

The criteria for the fatness groups of lamb and mutton are shown in the following tables.

LAMB GRADES

Lamb carcasses are allocated to one of five grades on the basis of fat content and are shown following.

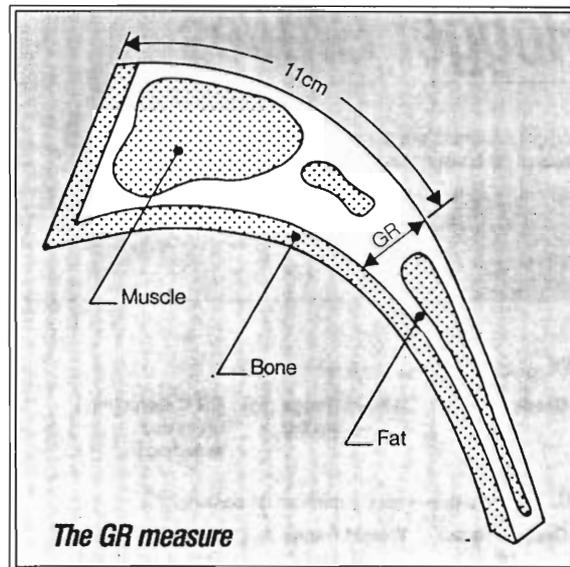
- A** grade lamb are lightweight and almost devoid of external fat
- Y** grade lamb carcasses have a light fat content.
- P** grade lamb carcasses have a medium fat content.
- T** grade lamb carcasses have a heavy fat content and will be cut and trimmed of excessive fat prior to export.
- F** grade lamb carcasses have an excessive fat content and will be cut and trimmed of excessive fat prior to export.
- C** (cutter) grade lamb carcasses are not eligible for export due to trimming or mutilation. Intact cuts from these carcasses may be exported. This grade comprises carcasses which have at least three of the four hind primal cuts (legs and long loins) acceptable as exportable cuts.

- M** (Manufacturing) grade includes carcasses which:
- * are too thin for export in carcase form as primal cuts
 - * are damaged but fail to meet the Cutter criteria.

CONFORMATION

While there is no specific grading for conformation the revised grading standards provide for the exclusion of 'leggy' carcasses from the 'PL' and 'PM' grades. Producers will receive the same payment for both 'leggy' and 'compact' carcasses and no separate identification will appear on killing sheets.

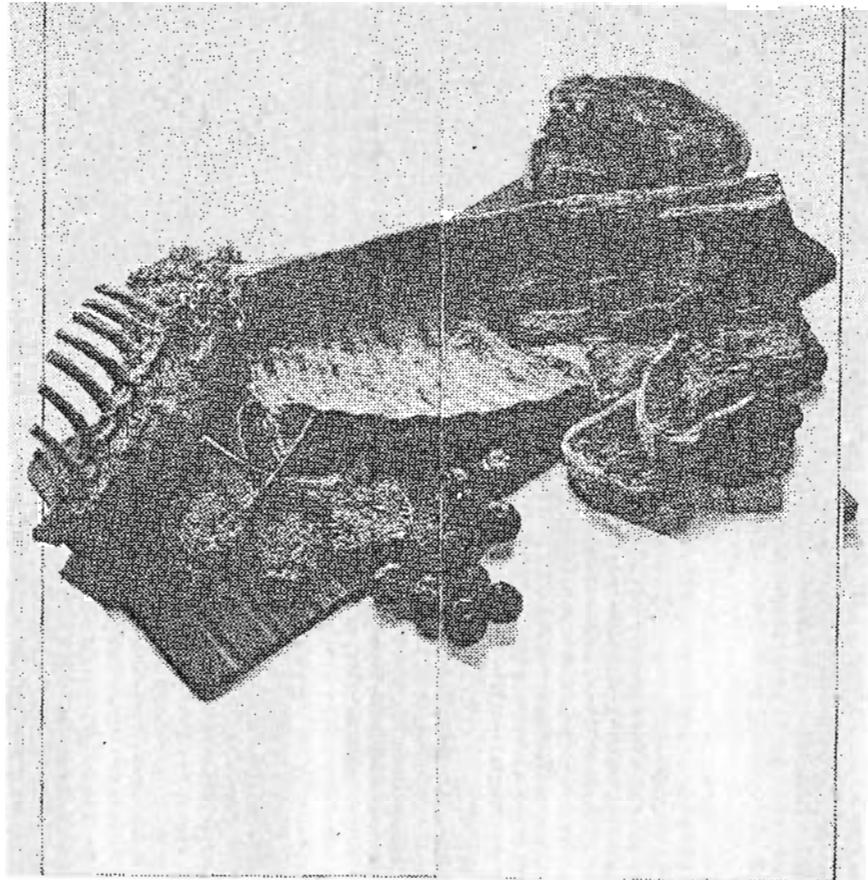
- * 'A' type carcasses that are in the 'L' weight range will be graded as restricted. 'YL'
- * Yellow coloured carcasses are not eligible for any grade.



SYMBOL	EXPORT CARCASE GRADES				FABRICATION GRADES			
	A	Y	PL	PH	F	M	Y	
FAT CONTENT	Almost Devoid	Light	Medium	Heavy	Excessive	Mixed	Mixed	
GR MEASUREMENT	NONE	YL - up to and including 6mm YM - up to and including 7mm YX up to and including 9mm	PL - over 6mm up to and including 12mm PM - over 7mm up to and including 12mm PX, PH over 9mm up to and including 12mm	Over 12mm up to and including 15mm	Over 15mm	Variable	None	
HOT WEIGHT								
UP TO BUT NOT INCLUDING 9.1 KG								
9.1 KG AND OVER - UP TO BUT NOT INCLUDING 13.3 KG		YL	PL		FL			
13.3 KG AND OVER - UP TO BUT NOT INCLUDING 17.1 KG		YM	PM		FM	MY		
17.1 KG AND OVER - UP TO BUT NOT INCLUDING 21.3 KG		YX	PX		FX			
21.3 KG AND OVER								

Major U.K. meat processor Barry Brooks, who uses 100% frozen N.Z. lamb, requires it to be lean and properly aged and conditioned. If the specifications are right, N.Z. can supply a much cheaper product in frozen form, and can more than compete with fresh British product in terms of price and presentation.

The British Catering trade supplies 11 m tourists a year, as well as institutions and the local trade. It does not want overfat lamb carcasses. It requires lamb cuts which are trimmed and packed into tight lean specifications; frozen lamb is quite acceptable.



Marks and Spencers, Britain's biggest retailer with a reputation for quality and service second to none, buys N.Z. chilled lamb. It believes the discerning meat buyer in Britain prefers fresh lamb all year round and is prepared to pay a premium for quality.

Accordingly Marks and Spencers requires lambs that are well muscled in the leg and loin, lean, with a minimum of 7 mm of fat cover at G.R. and a maximum of 10 mm. In addition the lambs must weigh 14 kg to 18 kg dressed.



Marks and Spencers use chilled N.Z. lamb from, October through to March when supplies of British lamb are not available.



Middle Eastern countries have until now taken a wide range of grades and weights of lamb, mainly in frozen carcass form. As the markets develop they are becoming more aware of the benefits of lean lamb, and in some instances they have shown an interest in buying chilled lamb.

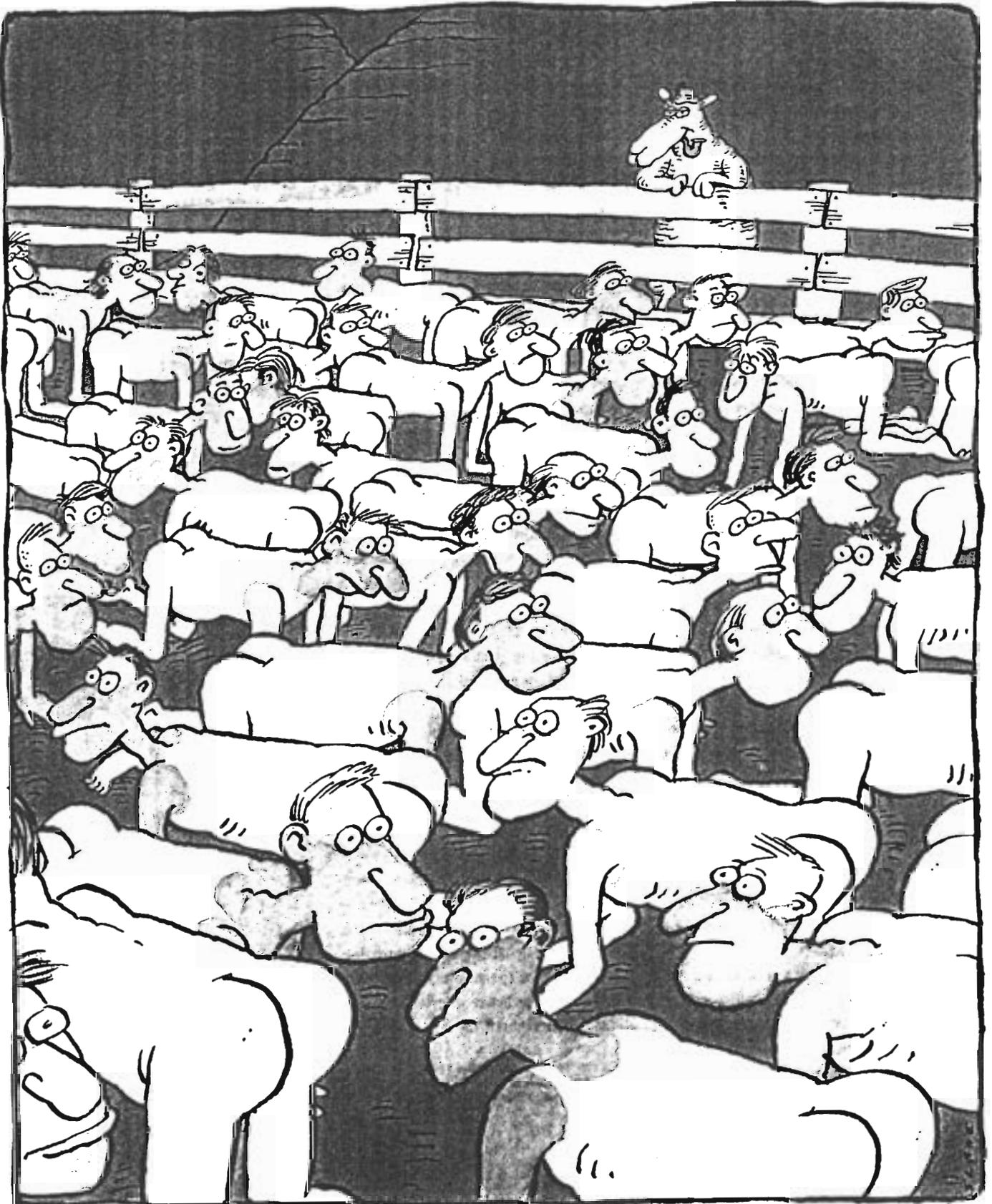
Greece is a lamb consuming country which has a preference for lambs in the 7 kg - 10 kg weight range. They require the lamb to be tender, tasty and with very little fat and are often cooked by spit roasting over an open fire.

Italy takes Beta lambs which have to be under 6 weeks of age and a carcass weight of no more than 7.5 kg. N.Z. betas tend to be too fat compared to Mediterranean bred betas. The lambs are cooked in oil; hence the need for leanness in uncooked lambs.

Most lamb processing and marketing companies require more heavy weight lambs from 16 kg to 21.3 kg + for further processing in the chilled trade. Markets that show a great deal of potential in this trade are West Germany, Japan and North America. These markets show a preference for fresh over frozen lamb, and so N.Z.'s chill technology is seen as a way to meet this market requirement.

If N.Z. can supply potential growth markets with fresh, healthy, tender, lean lamb, then the national kill of 31 m lambs will not be enough to satisfy profitable demand.

WHY IMPORT EXOTICS?



THE SHEEP FARMER

WHY IMPORT EXOTICS?

Traditional breed interests have for some time opposed the importation of exotic sheep, claiming that we have a wide enough genetic base within existing breeds to satisfy market requirements. They argue that through selection and breeding, we will be able to produce the ideal sheep.

N.Z. has only 20 of the world's 350 sheep breeds, and because of the emphasis on wool income, they have not generally been selected for carcass conformation and weight as in Europe.

The emphasis placed on wool breeds has led to the situation where many lambs are light and without much depth of muscle in the eye of the chop. They also lack muscling of the leg and as such are not suitable for further processing. Many lambs of all carcass weights are rather shallow-muscled and are described by the trade as being too plain.

Conversely many lambs that are taken to higher weights in an attempt to improve conformation and meat yield, are found to be too fat at time of slaughter.

Clearly there is a problem with the conformation and yield of the N.Z. lamb, and this has been highlighted by some of our overseas customers. The U.K. market regrets the loss of quality in our lamb since the demise of the Southdown cross which was much favoured until the late 1960's.

The Southdown cross until this time had produced an excellent early maturing carcass that had good conformation and fine grained meat. Unfortunately for the Southdown cross, it was seen to be prone to overfatness when taken on to the medium to heavy weights, and with the imposition of the 12 mm maximum G.R. measurement the breed went out of favour.

The imposition of the 12 mm G.R. tissue measurement did eliminate excessive fat cover on lambs at the time, but in the process conformation and shape were ignored. Since then, carcass conformation of the N.Z. lamb crop has slipped in comparison to locally grown U.K. lambs. There is a widespread belief that a well muscled lamb always yields higher, and this is something that the trade is becoming more aware of.

Recently the N.Z. Meat Boards Chief Production Supervisor, Mick Wilkin, made a study of the grading, quality and consistency of N.Z. lamb in the market place. He says eye appeal is a major factor in selling meat and in this respect, N.Z. lamb is not as good as it should be. Muscle size and thickness has been lost due to the use of dual purpose sheep breeds and with the emphasis on wool, meat conformation has suffered.

Mr Wilkin advocates incorporating conformation classes into the grading system, as a way to provide incentive for producers to provide the right sheep. He suggests producers may have to select more from traditional meat breeds and even consider the use of exotic meat breeds in an effort to improve muscle content.

As mentioned earlier, market requirements have encouraged farmers to grow a heavier lamb (16-21 kg) to be further processed for the chilled market. However, producers have found that there is a strong relationship between carcass weight and carcass fat content. In general, the heavier the carcass the fatter it is. Ewe lambs in particular are prone to G.R. levels above 12 mm if taken beyond the 14 kg carcass weight.

In order to get round the overfat problem with heavier weights, N.Z. farmers have left lambs as rams or cryptorchids. The fat content has been lower and the eye muscle larger on the ram lambs. Initially it looked as if ram lambs would overcome all problems associated with getting traditional breeds up to the required specifications. However, in practice, ram lambs created as many problems as they solved. Farmers found them to be difficult to manage, requiring more work and greater management skills.

Meat Companies found ram lambs reasonably acceptable up to the age of six months. From six months onwards, they became difficult to process. More importantly the quality of the meat deteriorated as it became darker in colour, strong, tough and un-acceptable in the market place.

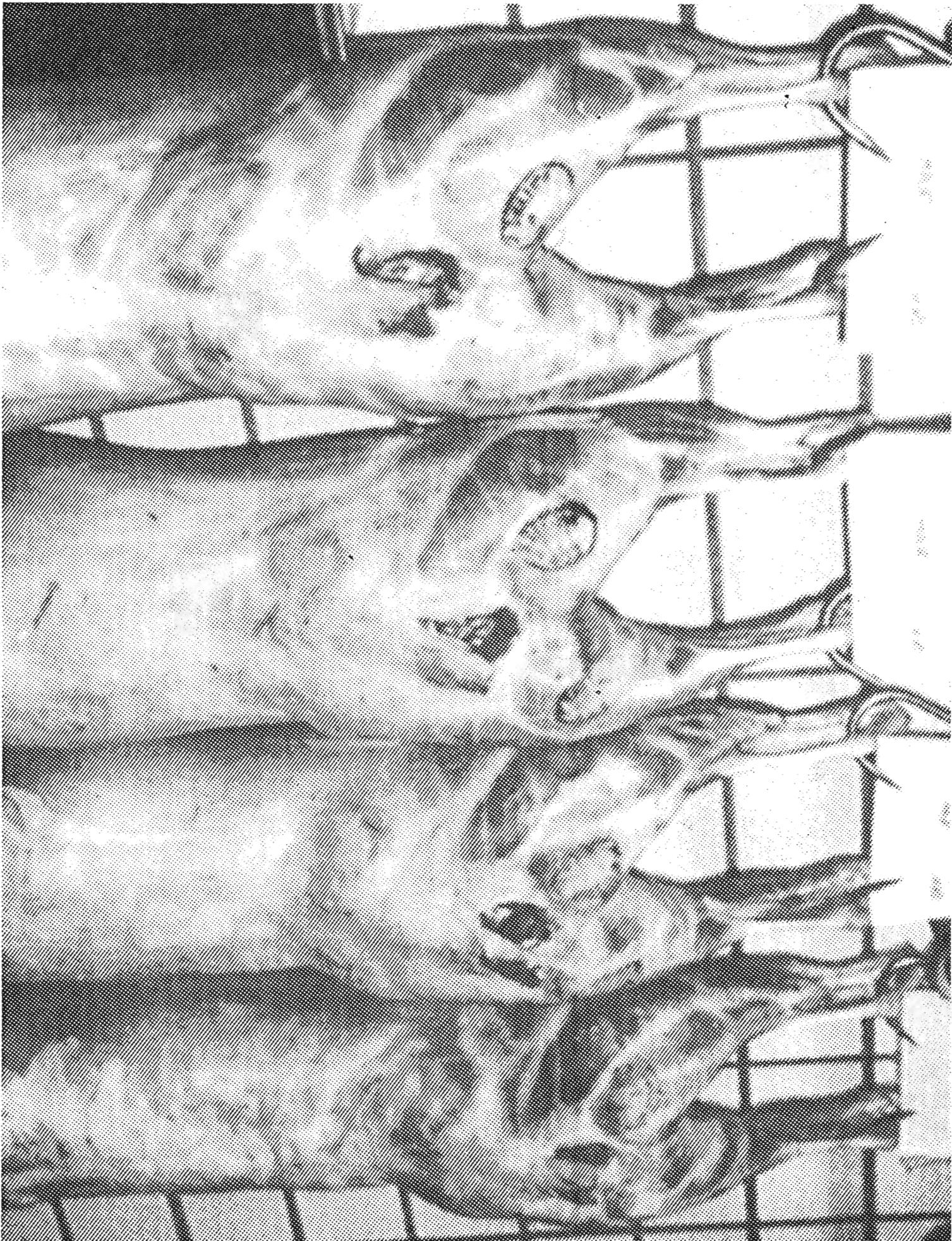
With regard to the problems of conformation, overfatness and ram lambs, it has become obvious that the N.Z. lamb producer must seek some solutions.

We know that we can improve the percentage of lean meat in our lambs slowly by selecting and breeding from our traditional breeds.

How long will it take? 5, 10, 15 years?

How long can we keep our markets waiting while we get our product up to standard?

Overseas experience would suggest that we can do it very quickly by introducing lean breeds such as the Texel as a terminal sire.



Well conformed Texel carcasses showing good depth of muscling in the leg.

THE IMPORTATIONS

Two importations of Scandinavian sheep have been made, late in 1984 and early in 1986. Firstly the Ministry of Agriculture and Fisheries imported 548 frozen embryos of the Finnish Landrace, Texel and Oxford Down Breeds, together with a small amount of frozen semen from the Finnish Landrace breed. These frozen embryos collected in Denmark and Finland were transferred into recipient ewes at Somes Island in 1985, some six months after their collection.

In that first year 268 were transferred, resulting in 142 progeny, an outstanding result. Most of the remaining embryos were transferred the following year. The purebred female progeny from these transfers have themselves been mated and subsequently subjected to hormonal treatments to increase the number of eggs shed with the resulting embryos being transferred to recipient ewes in a rapid multiplication programme.

Further, the purebred male progeny have been used in crossbreeding programmes to produce half and three quarter bred progeny which will also be available for release at the end of the quarantine period.

A second, much larger importation of Texel, Finnish Landrace, Oxford Down, White Headed Marsh and Gotland Pelt animals was made in February 1986 by Animal Enterprises Ltd, these sheep now being predominantly owned by the N.Z. Dairy Board. Three hundred ewes and 43 rams were imported and many of the females were pregnant at the time of arrival and lambed in February, March and April 1986.

Attempts at remating naturally in late May failed, due to the fact that the animals had only just lambed, and the day length rhythms were reversed from those in their countries of origin in the northern hemisphere. However, treatment with exogenous hormones resulted in successful mating of these animals and 85% lambed again in the same year in October and November. Initially these ewes were housed in an urban quarantine, the site being the animal pens at the closed Southdown Freezing Works in South Auckland.

However, by the end of 1986, some 10 months after their arrival, numbers had swelled to almost 900 and the quarantine station was virtually overflowing. Consequently in February, March and April 1987, the animals were moved to another primary quarantine site at Awahuri near Palmerston North. The facility having been established earlier in that year. The original imports and the females which were born early in 1986 were programmed for embryo transfer in 1987 when approximately 2,500 embryos were transferred to recipient ewes in April, May and June of that year.

In addition, most ewes lambed following those multiplication programmes. Again in 1988, as with the MAF programmes, very intensive multiple ovulation and embryo transfer programmes are being undertaken to multiply the number of animals which will be available for release at the end of the quarantine period.

QUARANTINE REQUIREMENTS

Opponents of the importation of Exotic Sheep have voiced strong concern about the possibility of importing exotic diseases along with the sheep. If this occurred, it would jeopardize the N.Z. livestock industry as we know it.

As there is some justification in these claims, I will outline quarantine measures taken to safeguard the interests of all concerned.

Quarantine requirements are to ensure that there is no risk of importing diseases which are exotic to N.Z. The period for quarantine stated in present protocols is:

"Provided there is no indication of any exotic disease these animals may be released five years from the date of implantation of the first embryo (in the case of embryos) or date of importation (in the case of live animals.)"

Before sheep can be imported, an evaluation of the proposal is undertaken and the following points are taken into consideration.

1. The country of origin.
2. The confidence the Ministry has in the Government and the Government veterinarians who sign the health certificate.
3. Diseases that prevail in that country.
4. Transport and quarantine upon arrival.

The most important diseases which are exotic to New Zealand are:

1. Scrapie.
2. Sheep Pulmonary Adenomatosis of Jaagasiekte.
3. Maldi Visna.
4. Borna Disease.
5. Enzootic Abortion. (A Chlamydial Infection).
6. Bluetongue.

There are also endemic diseases which occur in this country and sheep must be free of these.

THE RISK OF IMPORTING SCRAPIE WITH EXOTIC BREEDS OF SHEEP

Scrapie was first detected in New Zealand in 1952 in a flock of Suffolks in South Canterbury. The disease was traced through 13 lines of related animals and resulted in the destroying of 166 sheep.

The next reported outbreak was in 1954 in Southland. One hundred and ninety-one farms were affected and 4339 sheep were slaughtered. The 191 farmers whose sheep were affected were restricted to sale of stock by slaughter for three years. The last outbreak occurred in 1976 in an East Friesian on Mana Island. This outbreak resulted in the slaughter of all the East Freisian sheep and all crossbreds derived from them, a total of 700 animals.

Some of the risk factors associated with the import of sheep from known scrapie infected countries are:

1. The impossibilities of importing scrapie-free sheep as there is no method of correctly determining carriers of this disease until the disease manifests itself.
2. The high costs involved in containing an outbreak and eliminating the disease; other animals besides sheep can also be carriers.
3. Severe restrictions on the movement of the stock in the event of an outbreak; this would lead to curtailment of current breeding programmes.
4. The loss of export potential in New Zealand livestock.

The over-riding problem when importing sheep and goats is that for scrapie and pulmonary adenomatosis. There are no serological or biochemical tests that will positively identify affected sheep before clinical signs develop. These two diseases have a long incubation period and we are dependent upon the country of origin being able to certify that the diseases do not exist before we can consider importing sheep from that country.

In summary, N.Z. cannot import sheep from countries where scrapie exists.

Countries from which we have imported sheep in recent years are:

- Australia
- Denmark

Embryos can be imported from:

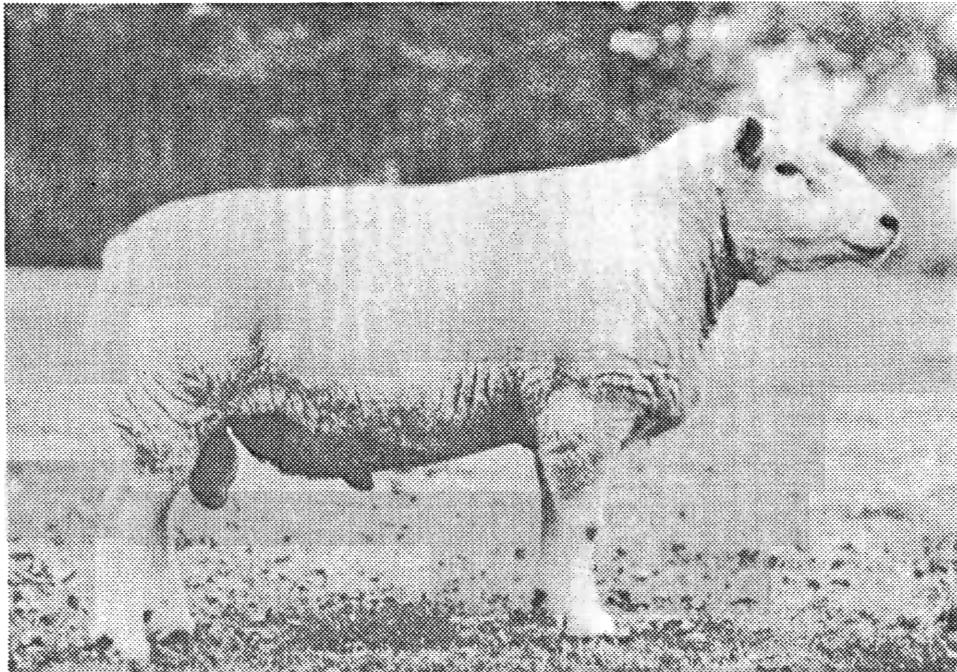
- Australia
- Denmark
- Finland
- Zimbabwe

To conclude, I believe that although a 100% guarantee against importing exotic diseases can not be given, all reasonable precautions are being taken by the appropriate authorities. All parties including exotic sheep breeding interests understand the importance of protecting N.Z's high quality animal health status. It is in everyone's interests to take the utmost care in this regard.

BREED CHARACTERISTICS

1. TEXEL

Originating from the Dutch Island of Texel, this breed is outstandingly popular in the U.K. and the continent for lamb meat production. It is an open faced breed with a lamb drop usually in the 150-170% range. The breed is hardy and is frequently kept outdoors, often in winter environments much harsher than those experienced in New Zealand. The main attribute of this breed is that it is very very lean in comparison with other terminal sire breeds which are currently used here in New Zealand. Further, the Texel has a very different carcass conformation in that the carcass is shorter and much blockier than breeds currently available here. Comprehensive studies in the U.K. and Ireland show that in comparison with purebred Suffolk animals the Texel grows approximately 9% slower, but at a carcass weight of 20 kg will have a 7.5% higher meat yield and correspondingly less total carcass fat. When the comparison of crossbred lambs sired by these breeds is compared the Texel at similar carcass weights will have approximately 4% less carcass fat and 4% more lean. In addition, the Texel crosses will have a 1% higher killing out percentage and about a 10% greater eye muscle area in the loin than the Suffolk cross animals.



The texel, a meaty beast

The much shorter blockier carcass, in conjunction with the significant changes in leanness, will make Texel and Texel cross animals particularly suitable for the further development of the cutting trade within the New Zealand sheep industry.

2. OXFORD DOWN

The Oxford Down which was derived initially from crossing the Hampshire Down and the Cotswold is reputed to be the largest and fastest growing of all of the British breeds and it also clips a heavier fleece than all other meat sire breeds. The fecundity of the purebred is high and matched the Border Leicester. Within the U.K. "traditional" rearing systems the Oxford has not been the breed of choice due to difficulties in obtaining a finish at younger slaughter ages. However, now that heavier, leaner carcasses are increasingly being sought, this breed is gaining in popularity.



Oxford downs, valued for their wool

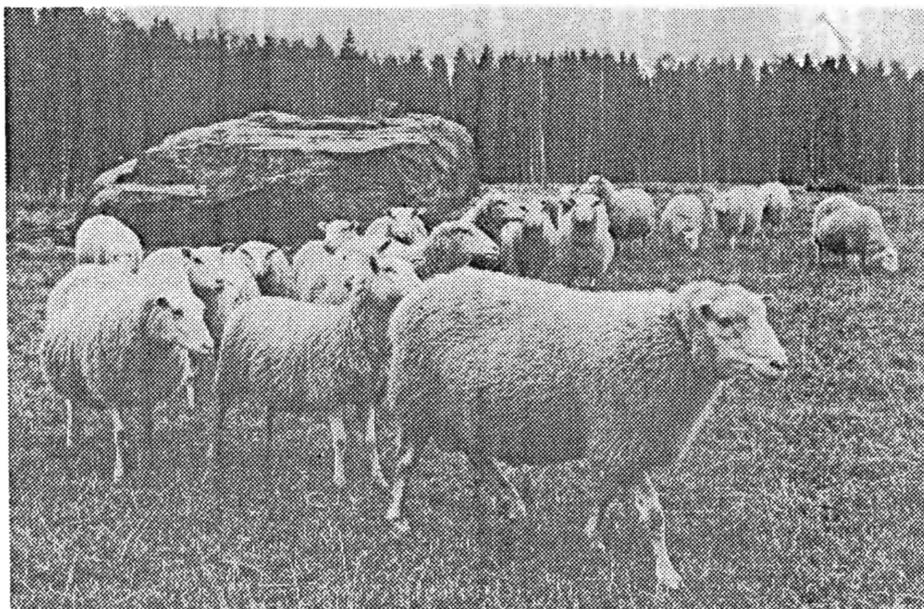
With a larger mature body size than both Texels and Suffolks, this breed has the potential to command a significant place in the New Zealand sheep industry.

3. FINNISH LANDRACE

This breed holds pride of place in the world as having the highest lambing performance with mature ewes frequently dropping of the order of 260% lambs. The Finn will have a place in the New Zealand flocks as a contributor to a synthetic breed which will greatly increase lambing percentage. For example, an infusion of 25% Finnish Landrace genes will result in 25-30% increase in lamb drop.

Somewhat unjustly, the Finn has a reputation for being small and not particularly robust. Certainly the Finnish Landrace sheep imported from the U.K. in the 1972 importation were much smaller and lighter than the present Finn sheep in quarantine (these animals were sourced from the U.K.). In Finland there has been a selection programme for body size implemented for more than 20 years and the ewe liveweights of animals presently in quarantine average 63 kg which is considerably heavier than most ewes in New Zealand, particularly in the North Island. Within the selection programmes in Denmark rams have to weigh at least 90 kg at 18 months to qualify for breed society registration.

Comparative data from MAF trials from the earlier importations (see table 2.) clearly show that the Finnish Landrace as a cross-breeding sire provides opportunities for increasing fecundity. The Finnish Landrace crosses had lower mortality to weaning, grew faster, were more fecund, but with the exception of the German White Headed Mutton, produced less wool than did Romney sheep of a similar age run under the same conditions. The German White Headed Mutton is very similar to the White Headed Marsh.



THE FINNISH LANDRACE

There is considerable variation in wool production of the Finnish Landrace sheep within quarantine and considerable emphasis is being put on fleece weight of the rams used so that differences in fleece weight of Finn crosses and existing ewe breeds can be minimised when the time comes to incorporate this animal as part of a ewe breed.

4. WHITE HEADED MARSH

As stated above, this breed is similar to the German White Headed Mutton which was imported by MAF in 1972. This is a much larger breed than, but closely resembles, the Romney and is one which is very tolerant of wet conditions. The average German White Headed Marsh ewes in quarantine are about 85 kg, and wool quality is very similar to the Romney.

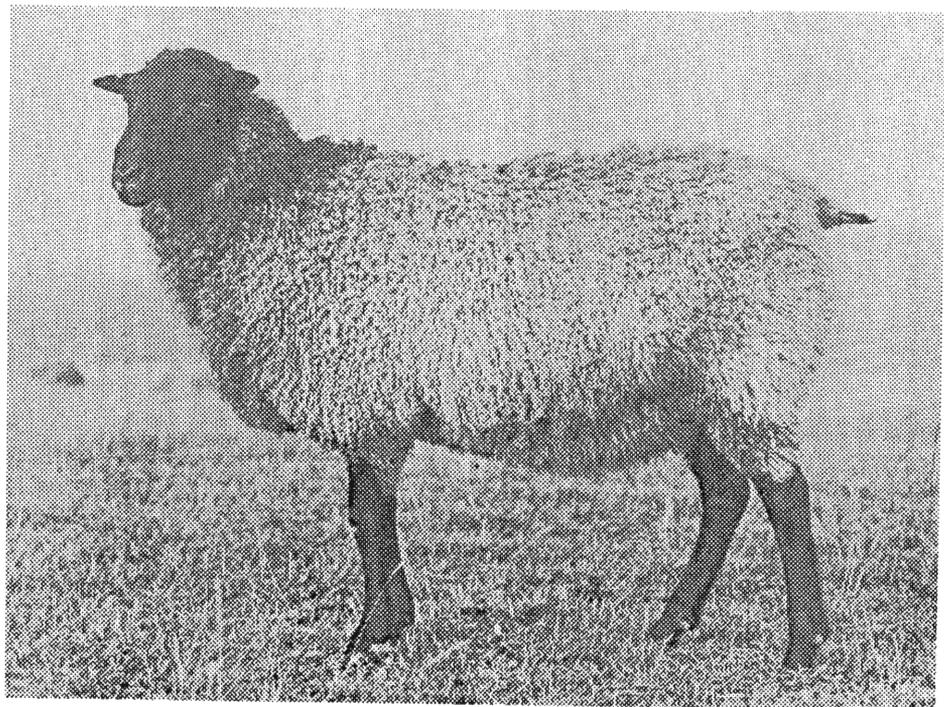


WHITE HEADED MARSH

Within flocks in Scandinavia, the lambing percentage is approximately 180 and it is likely that this breed will be used in upgrading programmes within the Romney breed where it can confer some of its size and fecundity to advantage.

5. GOTLAND PELT (SWEDISH PELT SHEEP):

The Gotland is a coloured sheep with a fleece which is black, brown or grey and particularly curly and lustrous. The animal is somewhat similar phenotypically to the Finnish Landrace and lambing percentages are of the order of 170-180%. The pelts of the Gotland are particularly valuable and lambs are slaughtered at 4-6 months of age with the pelts being highly sought after in the fashion garment trade. Prices usually paid are in the vicinity of \$US25-30 and the carcass, like the Finnish Landrace, is extremely lean. Conformation-wise, this breed, also like the Finn, is somewhat long and leggy although some of the carcass markets supplied by N.Z. are not particularly discerning with regard to carcass shape.



The Gotland Pelt breed does offer exciting possibilities for diversification within sheep farming to provide high quality pelts for the garment trade.

BREED EVALUATION DATA

The carcass composition of pasture-fed crossbred lambs of the Finn, Texel, Oxford Down, Border Leicester and Suffolk breeds was compared at the Hopuhopu Animal Quarantine and Research Station in 1987.

Early results were in close agreement with overseas studies which have highlighted the low subcutaneous fat depth of Texel crossbreeds in comparison with lambs from Suffolk sires at the same carcass weight.

Finn crossbreeds were relatively lean subcutaneously but had relatively more kidney fat.

Texel crosses showed superior eye muscle development at constant carcass weight.

A 5 year trial carried out in the U.K. by the Meat Livestock Commission produced some interesting results in 1987. Commercial flocks of Scottish Blackface, Scottish Half-Bred and Mule ewes were used to examine the carcass characteristics of 10 sire breeds. Whilst many of the sire breeds are unfamiliar with us here in N.Z., the Border Leicester, Dorset Down, Hampshire Down, Southdown and Suffolk give us a useful cross reference as to how the exotic breeds are likely to compare in N.Z.

An average of 43 sires was used per sire breed, and a total of 1402 lambs were analysed for tissue separation data.

CARCASS COMPOSITION OF LAMBS BY TEN SIRE BREEDS

TABLE 1
Early flocks: sire-breed means for carcass characteristics in dissected animals†

Sire breed	No. of lambs	Tissue in carcass (g/kg)					Ratios		
		Lean	Inter-muscular fat	Total fat‡	KKCF	Bone	Lean: bone	Lean: fat	Subcutaneous: inter-muscular fat
Border Leicester	63	546 ^a	114 ^{ab}	270	30	167	3.30 ^{ab}	2.09	1.10 ^{abc}
Dorset Down	82	550 ^a	111 ^{ab}	269	32	164	3.39 ^{ab}	2.16	1.13 ^{abc}
Hampshire Down	70	546 ^a	114 ^{ab}	270	31	166	3.31 ^{ab}	2.12	1.10 ^{abc}
Ile de France	34	542 ^a	112 ^{ab}	270	33	170	3.25 ^a	2.23	1.10 ^{abc}
N. Country Cheviot	65	547 ^a	113 ^{ab}	269	31	167	3.33 ^{ab}	2.21	1.10 ^{abc}
Oxford Down	72	543 ^a	115 ^b	272	32	168	3.26 ^a	2.09	1.09 ^{ab}
Southdown	69	551 ^a	116 ^b	272	31	159	3.49 ^b	2.17	1.07 ^a
Suffolk	77	546 ^a	115 ^{ab}	272	32	165	3.34 ^{ab}	2.08	1.09 ^{abc}
Texel	56	565 ^b	106 ^a	264	33	154	3.68 ^c	2.29	1.18 ^c
Wensleydale	48	552 ^a	107 ^a	266	35	165	3.39 ^{ab}	2.15	1.17 ^{bc}
Approx. s.e.		2.6	2.1	2.5	4.1	1.9	0.048	0.036	0.020
Significance of effects§									
Sire breed		***	**			***	***	***	**
Flock-year (within dam breed)		**	**		***	***	***	*	*
Sex				***	***	***	***		
Sire-breed × dam breed						*		*	
Regression on SF _d (g/kg)		-1.0	0.3	1.5	0.2	-0.4	0.003	-0.017	0.006

† Sire breeds were compared at 125 g/kg SF_d. Means with the same superscript within the same column did not differ significantly ($P > 0.05$).

‡ Total separable fat (sum of subcutaneous, intermuscular and KKCF depots).

§ Effects of dam breed, sire-breed × flock-year and sire-breed × sex were not significant ($P < 0.05$).

|| All regression coefficients were significant ($P < 0.001$).

CARCASS COMPOSITION OF LAMBS BY TEN SIRE BREEDS

TABLE 6
Sire-breed means for carcass lean and separable fat proportion (g/kg) obtained from different analyses

Sire breed	Observed SF _e † (without adjustment)	Full sample estimated by double sampling.		Dissected sub-sample			
		Adjustment to equal SF _e †		Adjustment to equal SF _e		Adjustment to equal SF _d	
		Lean	Separable fat	Lean	Separable fat	Lean	Separable fat
Early flocks							
Border Leicester	120	550	265	548	267	546	270
Dorset Down	126	550	270	550	268	550	269
Hampshire Down	123	541	275	542	276	546	270
Ile de France	110	555	259	553	254	542	270
N. Country Cheviot	98	554	261	554	261	547	269
Oxford Down	127	542	273	540	276	543	272
Southdown	135	542	283	539	288	551	272
Suffolk	121	552	267	547	271	546	272
Texel	104	574	254	569	259	565	264
Wensleydale	112	556	263	555	263	552	266
Late flocks							
Border Leicester	102	562	257	560	260	562	257
Dorset Down	123	557	267	555	267	560	261
Hampshire Down	116	562	263	558	268	564	260
Ile de France	105	571	255	571	256	567	261
N. Country Cheviot	95	568	251	566	255	560	261
Oxford Down	121	560	258	559	257	558	260
Southdown	128	559	273	555	276	566	262
Suffolk	119	567	252	567	254	562	261
Texel	104	590	240	588	242	579	254
Wensleydale	106	567	253	568	251	567	252

† Taken from Kempster *et al.* (1987).

It is interesting to compare the Texels in the above tables.

Texel crosses had the highest carcass lean proportion ($P < 0.05$); their advantages over the Suffolk crosses were 19 g/kg (early flocks) and 17 g/kg (late flocks) reflecting both a high lean:bone ratio and a higher lean:fat ratio.

Again in a similar trial involving 3360 lambs of which one-third had the left side dissected. Sire breeds were compared when their progeny were slaughtered at the same estimated carcass subcutaneous fat proportion (approx 120 g/kg).

TABLE 8
Early flocks: sire-breed means (computed over the three dam breeds)

	Border Leicester	Dorset Down	Hamp- shire Down	Ile de N. France	N. Country Cheviot	Oxford Down	Southdown	Suffolk	Texel	Wensleydale	Approx. s.e.
Age at slaughter (days)	208	153	162	172	187	190	148	176	182	224	6
Carcass weight (kg)	19.8	17.2	17.7	18.4	18.9	20.1	16.3	19.6	19.5	20.6	0.2
Daily carcass- weight gain (g)	104	119	120	118	109	113	117	121	118	97	3
<i>M. longissimus</i> width (A) (mm)	56.7 ^{cd}	54.9 ^{ab}	55.7 ^{bc}	57.2 ^{cd}	57.1 ^{cd}	57.4 ^{cd}	53.9 ^a	58.1 ^{dc}	59.4 ^c	58.9 ^c	0.4
depth (B) (mm)	26.8 ^{ab}	26.1 ^{ab}	26.0 ^a	26.2 ^{ab}	26.2 ^{ab}	26.7 ^{ab}	26.3 ^{ab}	27.1 ^{ab}	27.9 ^b	27.3 ^{ab}	0.4
Carcass conformation (15-point scale)	7.1 ^a	8.4 ^{bc}	8.2 ^{bc}	7.2 ^a	7.7 ^{ab}	7.8 ^{ab}	8.8 ^c	8.5 ^{bc}	8.8 ^c	7.2 ^a	0.21
Tissue in carcass (g/kg)											
lean	550 ^{ab}	550 ^{ab}	541 ^a	555 ^b	554 ^b	542 ^a	542 ^a	552 ^{ab}	574 ^c	556 ^b	2.9
separable fat	265	270	275	259	261	273	283	267	254	263	3.1
Daily tissue- weight gain in carcass (g)											
lean	55	64	62	64	58	59	62	65	66	53	1.4
separable fat	27 ^{ab}	31 ^c	32 ^c	29 ^{bc}	27 ^{ab}	30 ^{bc}	33 ^c	32 ^c	30 ^{bc}	25 ^a	0.9

^{a,b,c,d} Means with the same superscript did not differ significantly ($P > 0.05$).

Texel crosses had a higher carcass lean proportion than other crosses; their advantage over Suffolk crosses was 22 g/kg.

Significant differences were recorded both in the width and depth of the *m. longissimus*. The measurements were generally higher for sire breeds of larger adult body size (heavier carcass weights) although the Texel crosses tended to have larger muscle cross-sections, and Border Leicester crosses smaller cross sections than expected for their size.

The highest rates of separable fat weight gain were achieved by the Texel, Suffolk, Dorset Down and Hampshire Down crosses. Sire breed crosses with a high rate of separable fat gain also tended to have a high rate of lean weight gain.

TABLE 12
*Comparison of Suffolk and Texel crosses in different trials
 (results are shown as an index of the Suffolk cross results =
 100)†*

	More O'Ferrall and Timon (1977)	Wolf <i>et al.</i> (1980)	This study	
			Early flocks	Late flocks
Daily carcass-weight gain	93	92	98	99
Daily lean-weight gain	NA‡	96	104	104
Conformation	NA‡	105	104	101
<i>M. longissimus</i> area	107	107	105§	103§
Lean in carcass	105	105	103	103

† Comparisons were made at approximately the same level of fatness.

‡ Information not available.

§ Estimated from muscle width (A) × depth (B).

|| Estimated from the lean proportion of the best end neck joint

Table 12 illustrates that although Texels can be marginally behind Suffolks in carcass weight gain, they more than make it up in lean weight gain, conformation and muscle size.

In conclusion, the trial demonstrates that there is considerable scope to increase carcass weights at a given level of fatness by breed sub-stitution, although in some cases this may be at the expense of growth and increased time to slaughter. However, with the exception of the Texel (among the breeds considered), there is less potential to increase carcass lean proportion at a given level of fatness.

Texel crosses had a clear advantage over other crosses in carcass lean proportion and there is a case for promoting the breed for this characteristic.

In another trial run by the Meat and Livestock Commission where 1400 crossbred lambs were evaluated to determine sire performance, Texel crosses again came out favourably.

TABLE II

Allometric growth coefficients for tissues and fat depots on side weight, and sire breed and sex means for tissue and fat depot weights in the side (kg) at equal side weights

Flock type	Lean		Bone		Subcutaneous fat		Total separable fat		Intermuscular fat		Perinephric and retroperitoneal fat	
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
Allometric growth coefficient (b)	0.77	0.84	0.51	0.53	2.07	2.03	1.82	1.66	1.50	1.32	2.11	1.80
S.E. of b	0.015	0.016	0.025	0.023	0.053	0.060	0.039	0.046	0.037	0.039	0.073	0.084
Overall mean weight	4.97	4.90	1.47	1.40	1.10	0.98	2.40	2.22	1.01	0.96	0.27	0.26
Sire breed												
Border Leicester	5.04	5.02	1.54	1.49	1.03	0.89	2.28	2.07	0.98	0.93	0.24	0.22
Dorset Down	4.82	4.78	1.40	1.35	1.25	1.13	2.64	2.47	1.06	1.01	0.31	0.30
Hampshire Down	4.80	4.85	1.43	1.34	1.25	1.09	2.64	2.40	1.07	1.03	0.30	0.26
Ile de France	4.93	5.07	1.47	1.38	1.09	0.92	2.43	2.13	1.02	0.95	0.29	0.25
North Country Cheviot	5.06	5.05	1.53	1.45	0.97	0.89	2.21	2.09	0.97	0.93	0.25	0.26
Oxford Down	4.94	4.91	1.55	1.49	1.06	0.95	2.34	2.18	1.01	0.96	0.26	0.25
Southdown	4.69	4.71	1.31	1.23	1.41	1.25	2.90	2.68	1.15	1.08	0.32	0.32
Suffolk	4.97	4.95	1.50	1.42	1.06	0.96	2.38	2.21	1.03	0.97	0.27	0.26
Texel	5.27	5.22	1.47	1.38	0.94	0.84	2.10	1.96	0.90	0.87	0.24	0.23
Wensleydale	5.11	5.09	1.57	1.51	0.99	0.88	2.18	2.00	0.91	0.86	0.26	0.24
Approx. S.E. of mean ¹	0.03	0.04	0.02	0.02	0.03	0.03	0.04	0.04	0.02	0.02	0.01	0.01
Sex												
Female	4.89	4.92	1.43	1.37	1.16	1.01	2.51	2.28	1.03	0.97	0.30	0.28
Castrated male	5.02	5.01	1.52	1.43	1.04	0.94	2.29	2.14	0.98	0.95	0.25	0.24
Approx. S.E. of mean ¹	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01

¹Sire breed and sex effects were significant ($P < 0.001$) for all characteristics.

Texels had the advantage in lean weight gain, reflecting both a lower bone weight and lower fat weight.

Returning to trial work done in N.Z. by the MAF at Hopuhopu, it was considered that improvements in prolificacy, milking ability, growth rate, lean meat production and the distribution of fat, muscle and bone within the carcass were desirable features for consideration in new breeds imported to N.Z.

The crossbreeding trial at Hopuhopu involved 10 Finn rams, 9 Oxford Down rams, 9 Texel rams, 5 Border Leicester rams and 5 Suffolk rams. All were single sire mated to Romney and Coopworth ewes.

The 214 ram lamb progeny were slaughtered in March 1987 at an average age of 29 weeks.

Carcass data included in this report are confined to linear measurements taken on the cut carcasses.

Subcutaneous fat depth measurements were taken in the shoulder (S1, S2), loin (C,, J) and leg (L2, L3) regions of the carcass. Tissue depth measurement G.R. was also taken as were the linear measurements F, T and measures of leg length (LL) and carcass length (CL).

TABLE 1 Carcass characteristics^a of crossbred ram lambs by breed of sire and relative to Suffolk crosses (100) (see text for definition of measurements)

Breed of Sire	GR	Fat Depths (mm)						Eye Muscle (cm)			Length (cm)				Kidney Fat (kg)
		Shoulder		Loin		Leg		A	B	AxB	F	T	CL	LL	
		S ₁	S ₂	C	J	L3	L2								
Finn	76	52	68	62	68	74	54	101	95	96	108	106	103	104	131
Texel	73	78	71	62	68	86	46	105	102	107	101	102	99	99	75
Oxford	93	98	96	85	82	112	87	101	100	102	101	101	100	99	97
Border	109	85	95	96	102	91	87	96	100	97	104	102	101	102	101
Suffolk ^b	7.28	1.16	4.43	2.92	6.77	4.57	4.30	5.36	2.64	14.1	26.2	19.3	98.4	44.0	0.206
	^c (0.49)	(0.22)	(0.41)	(0.27)	(0.45)	(0.52)	(0.39)	(.075)	(.044)	(0.30)	(0.22)	(0.13)	(0.40)	(0.31)	(.014)
RSD ^d	2.07	0.95	1.72	1.14	1.91	0.21	1.63	0.32	0.18	1.28	0.93	0.55	1.71	1.32	.058
Signif. ^e	***	ns	**	***	***	*	***	***	**	***	***	***	***	***	***

^a adjusted for carcass weight
^b least squares mean
^c standard errors (in brackets)
^d residual standard deviation
^e significance of adjusted sire breed means

Averaged over all six fat depths, Border and Oxford crossbred lambs were 7% leaner than Suffolk crosses. Texel and Finn crosses were considerably leaner (30-40%) in comparison with Suffolk crosses. While sire breed effects on the carcass weight covariate were significant only for L2, Finn- and Texel-sired lambs in particular showed consistently low regression coefficients in comparison with other breed crosses indicating greater leanness advantages for heavier compared to lighter animals.

Data in Table 1 also suggests evidence of breed differences in the distribution of subcutaneous fat. At the same carcass weight, Finns appear to be relatively leaner for the more ventral fat depth measurements (s1 compared with S2; C compared with J) and in the shoulder area compared with the

loin and leg. Oxfords appear to be somewhat leaner and Borders somewhat fatter in the loin compared with their ranking relative to Suffolks at the shoulder and leg sites. The leanness advantage of Oxford over the Border crosses was particularly pronounced in the loin region and for the GR measurement.

Sire breeds ranked differently for kidney fat weight than for subcutaneous fat depth, overseas evidence of the propensity for Finns to lay down internal fat being confirmed by these results (McClelland and Russel, 1972). By contrast the Texel ranked lean for this fat depot as well.

Breed rankings for eye muscle dimensions were most marked for the Texel, once again in line with overseas evidence (Wolf et al. 1980). The transverse breadth measurement (A) showed greatest variation among breeds and with liveweight and was responsible for the superiority of Oxford over Border crosses.

Leg and carcass length measurements showed that Finn-sired lambs were most divergent having relatively longer legs even than Border cross-breds.

In broad terms the results observed are in line with similar investigations reported from the U.K. (Wolf et al. 1980; Wolf and Smith, 1983; Kempster et al., 1987) and Ireland (Hanrahan, 1982). In their studies Texel crosses had significantly less fat than Suffolk crosses (79% and 83% of the Suffolk mean, respectively). The regression coefficients observed here also indicate that Texel sired lambs which grew faster and/or were older than average, were also relatively more lean than the corresponding heavier lambs of the other breeds. This suggests that the leanness advantage of Texels may be more pronounced for lambs taken to heavier carcass weights.

GR measurements closely reflect the average fat-depth rankings for Texel, Oxford and Suffolk crosses but Finn and Border crosses were somewhat leaner than expected from their relative GR ranking.

The low subcutaneous fatness of Finn crossbred lambs was also most noticeable in these results but the leanness characteristic did not extend to the kidney fat depot. Finn crossbreds also produced leggier carcasses at the same carcass weight.

Eye muscle dimensions for Oxford and Suffolk crosses were intermediate between the extremes set by the Finn and Border (low) and Texel (high) crossbreds. The advantage to Texel crosses over Suffolk crosses agreed closely with the results obtained by Wolf et at. (1980). In overseas trials this advantage has been accompanied by significantly greater weights of lean in carcasses of the same weight in comparison

with most other breeds (Wolf and Smith, 1983; Kempster *et al.* 1987). Oxford crosses also displayed eye muscle superiority at constant carcass weight, especially over Border crosses.

There is remarkable agreement between these results and overseas studies in which the Texel breed has been compared, mainly against the Suffolk. The overall impact of the results to the potential of the Texel to lamb production in this country is further strengthened by its low GR and high eye muscle development in relation to the Border Leicester and its white-wool features in comparison with the Suffolk.

CONCLUSIONS

Results achieved in trials both in the U.K. and N.Z. suggest that the use of exotic sheep will greatly benefit the N.Z. Sheep and Meat Industry.

1. TEXEL

This animal will be particularly attractive to the lamb industry due to its leanness and carcass conformation.

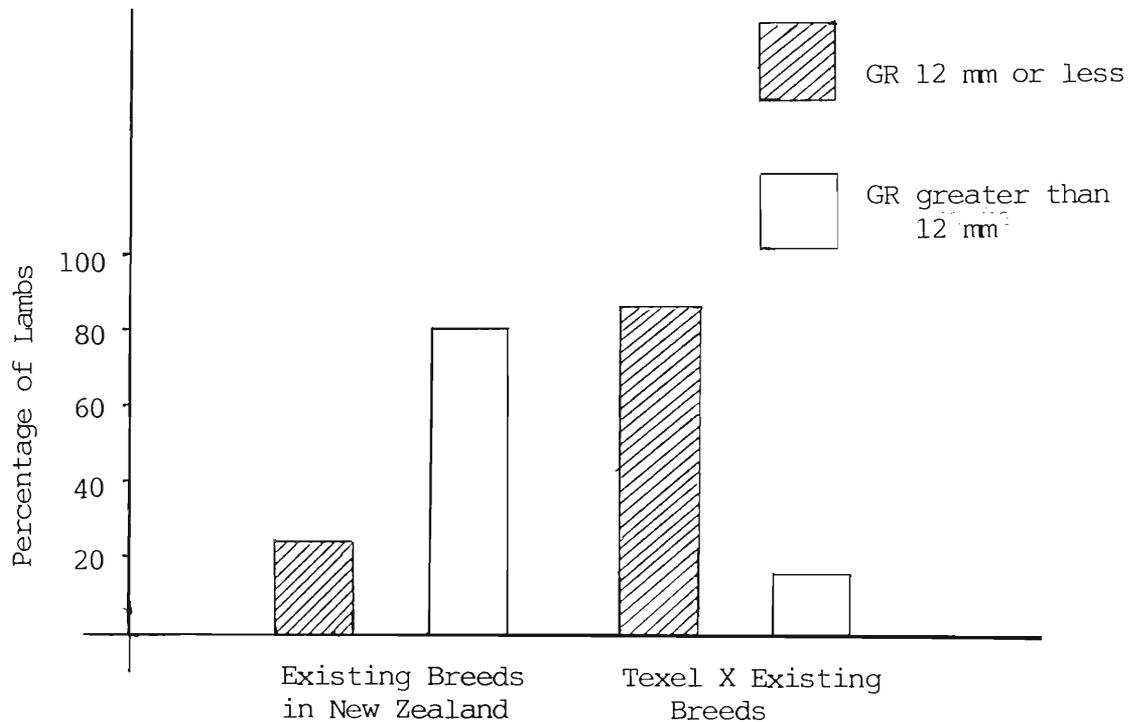


THE TEXEL

The value of the heavier, leaner lambs produced by mating ewes with Texels depends on the particular schedule values operating from individual companies at the time. However, reference to Figure 1 shows that in comparison with the "average New Zealand flock" Texel crosses are much, much leaner. In fact, Texel cross carcasses can be grown to a carcass weight of approximately 3 kg heavier without any increase in the level of carcass fatness. This is without any selection within the Texel breed itself, and certainly there is the opportunity through selection programmes to make Texels even leaner if necessary.

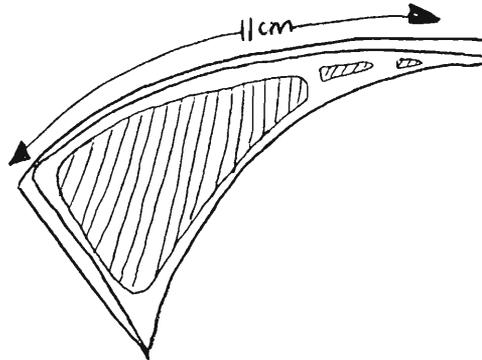
Figure 1. Percentage carcass fat in lambs from the "NZ flock" compared with Texel cross lambs from the same dams.

The effect of Texel on the percentage of 20 kg ram lambs with a GR measurement of 12 mm or less.

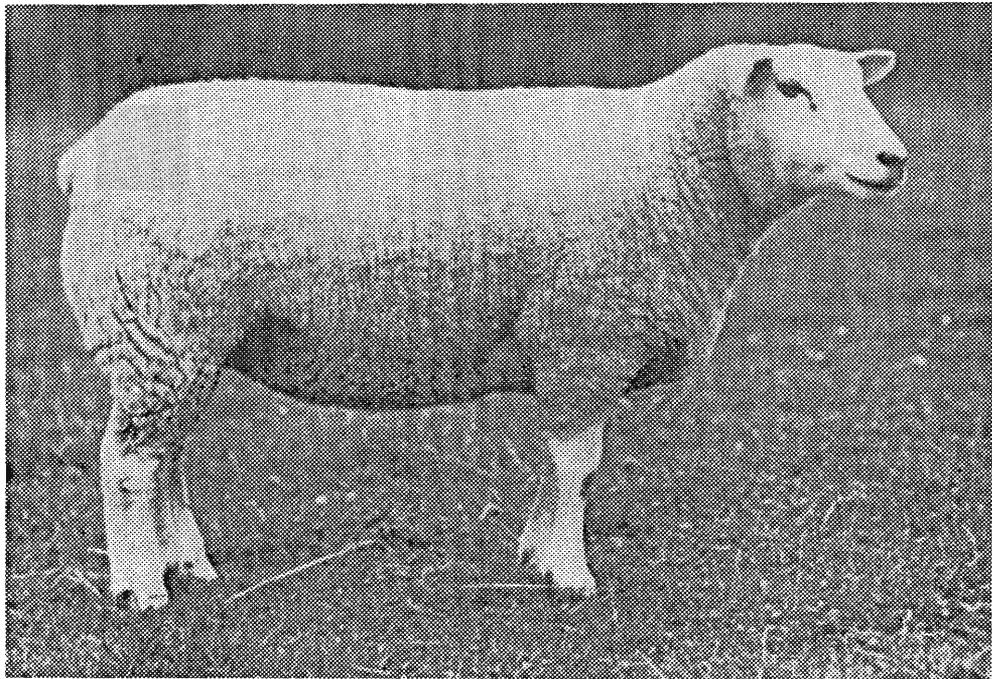


If a comparison is made at the WX grade which was offered by Waitaki International for some years, that grade demanding of a 20 kg carcass with a maximum GR measurement of 12 mm (see figure 2), with existing breeds in New Zealand about 25% only of ram lambs could be expected to come within this criterion of fatness when animals were grown quickly up to the necessary slaughter weight of approximately 48 kg. It is this fact that has made the skills of lamb drafters in selecting the leaner animals necessary to avoid the substantial reductions in price should animals go beyond a GR measurement of 12 mm. At the present time, animals which fall with a category of 12-15 mm GR have little or no reduction in value in some company schedules while in others there is a reduction of more than 50% in the value of the lamb.

Figure 2. GR measured 11 cm for the midline on the 13th rib is the main measurement of fatness on which the NZ meat grading system is based.



What the Texel and Oxford sires do offer the New Zealand industry is the ability to grow lambs into the 20+ kg range without excessive fat cover. Also in the medium weight ranges heavier carcasses than are possible now with minimal fat cover can be produced. The level of nutrition will however have to be extremely good to consistently grow lambs to heavy weights.



THE TEXEL

It may also be that the Texel is used as part of a ewe breed for specialist lamb production. The Texel breed has wool quality and weight rather similar to the Perendale, and the use of the breed in a composite ewe breed will cause some reduction in fleece weight. With this strategy such a decline in production must be weighed against the premiums which should be paid for the half or three-quarter Texel lamb progeny.

2. OXFORD DOWN

The Oxford Down being reputedly the largest breed in the world will also play a part in the developing production of larger lean lambs. Its part will however not be as dramatic as the Texel.

The Oxford produces more wool than other down breeds but still less than longwool ewe breeds in New Zealand.

Comparisons with other breeds give an indication of the Oxford's value. The most popular specialised heavyweight sire at present used in New Zealand is the Suffolk, with the Poll Dorset making some significant increase in popularity in the past few years.

In U.K. trials Oxford cross lambs have shown a 4% faster growth rate than Suffolk cross animals while being slightly leaner. (It should be noted that the Texel, although being dramatically leaner than other meat sire breeds, will not grow as fast as progeny of Suffolks, Oxfords etc.)



THE OXFORD DOWN

The Oxford Down will be useful in production systems which aim at the production of largely heavy lambs. They will probably however not be nearly as popular as the Texel, and prices for rams accordingly will be lower.

3. FINNISH LANDRACE

The use of the Finn as a part of a composite breed will bring increases in lamb drop in the crosses, i.e.

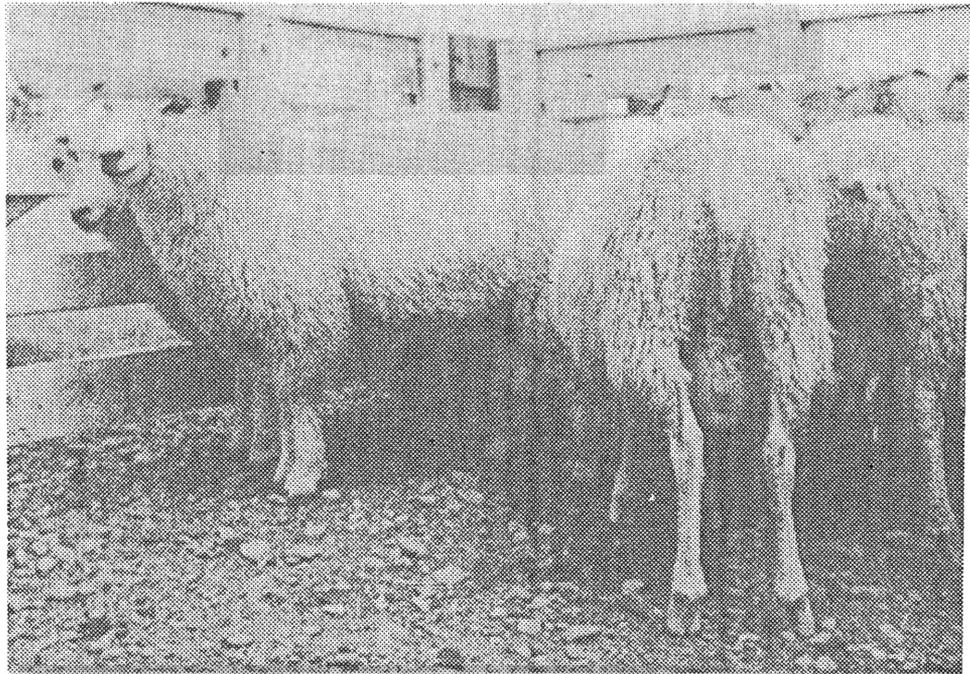
1/2 Finn	+ 50-60% lamb drop
1/4 Finn	+ 25-30% lamb drop
1/8 Finn	+ 12.5% - 15% lamb drop

Wool weights of Finn crosses will however be lower than contemporaneous Romney or Coopworth animals (i.e. 15% approximate reduction in Finn x Romney.) Comparative data with 1/2 and 1/4 Finns however shows their lamb production and growth to be superior to Romneys.

Early information with Finn animals has shown a wide variation in fleece weight. Finn wool has a very soft handle, is very lustrous and quite fine (i.e. 27 microns). These characteristics could be useful in the production of specialty wools which may compete with mohair as a fibre.

It is most likely that the Finn will be used in industry as a 1/2 bred type, i.e. 1/2 Finn 1/2 Romney rams across Romney ewes, or 1/2 Finn 1/2 Perendale rams across Perendale ewes to produce 1/4 Finn progeny for breeding ewes. An added advantage of the Finn is its sexual precocity which will mean that hoggets will be more readily mated at 7-8 months of age. This practice is however not a common one in New Zealand and it is difficult to see that there will be a major change. In the U.K. and Ireland (and France) where lamb prices are very high and wool is something of a by-product the practice is more common, but even then often not practised.

Economic analyses of the advantages of an infusion of Finn blood into New Zealand flocks point to major increases in production and profitability (Bushnell P and Hutton J.B., 1982. Better use of pasture with Finnish Landrace cross, the Agricultural Economist 3:7). On the basis of these comparisons, Finn and 1/2 Finn rams should be worth substantial price premiums.



*Fluffy white headed marshes (left)
with a finnish landrace*

There are however a number of factors which have to be considered or overcome when considering returns from this breed.

a) There is a history of low adoption of the Finn in other sheep industries, e.g. France, U.K., Ireland, United States etc. In these industries lamb is worth substantially more than it is in New Zealand and with the high fecundity of the Finn its adoption within these industries could have been expected. As a counter to this problem the improved high liveweight Finns (i.e. selected for body size for 20 years in Finland) have not been extensively used.

b) The breed has a very bad reputation as producing litters of very small lambs which have a low survival. Even though MAF trials in New Zealand show the Finn crosses to be very productive much farmer opinion points to very poor performance of the Romneys as the reason for the apparent superiority of the Finn crosses. The stigma against Finns will be difficult to overcome completely within the farming community.

c) The breed will be used mainly as a half to produce 1/4 animals. Small numbers of Finns can therefore very rapidly produce very large numbers of 1/2 Finn rams.

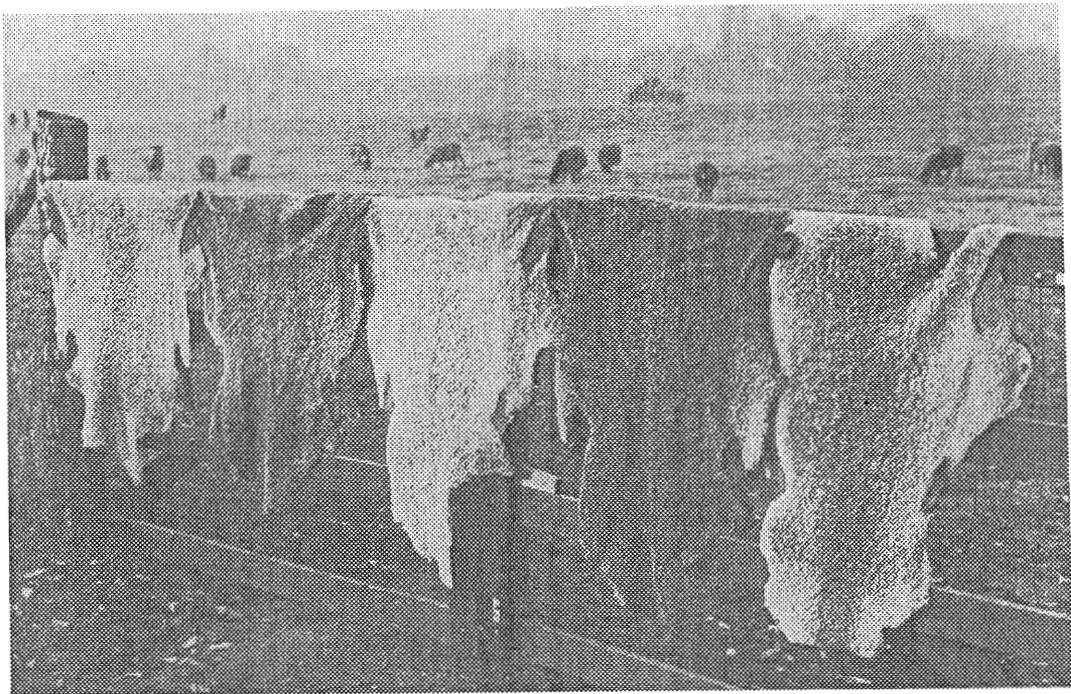
4. GOTLAND PELT

This breed was virtually unknown to the New Zealand farmer, and will remain so until there is a substantial increase in publicity.



*The curly dark grey gotland, a valuable
fleece*

However the returns from the pelts in Sweden and Denmark indicate that the breed may be widely sought when it becomes available. There is a wide network of coloured sheep breeders throughout the world. At a world Conference on Coloured Sheep at Massey University in 1985 there were many overseas visitors including more than 50 from each of Australia and the United States. It is very likely that with good promotion there will be significant demand for export and high prices will therefore be realised.



Examples of
further processed,
high quality
Gotland Pelts.



5. WHITE HEADED MARSH

The WHM is really like a large Romney. It will confer some advantage of fecundity providing levels of reproductive performance in New Zealand the same as is achievable in Scandinavia.

The price breeders will be prepared to pay for these animals is debatable and will depend on:

- a) promotion
- b) how well grown and presented the sale stock are
- c) numbers available.

In summary therefore: Texel crosses with a high carcass lean proportion, reflecting both a high lean:bone ratio, and a high lean:fat ratio, will be popular with the meat industry because there will be less waste during further processing.

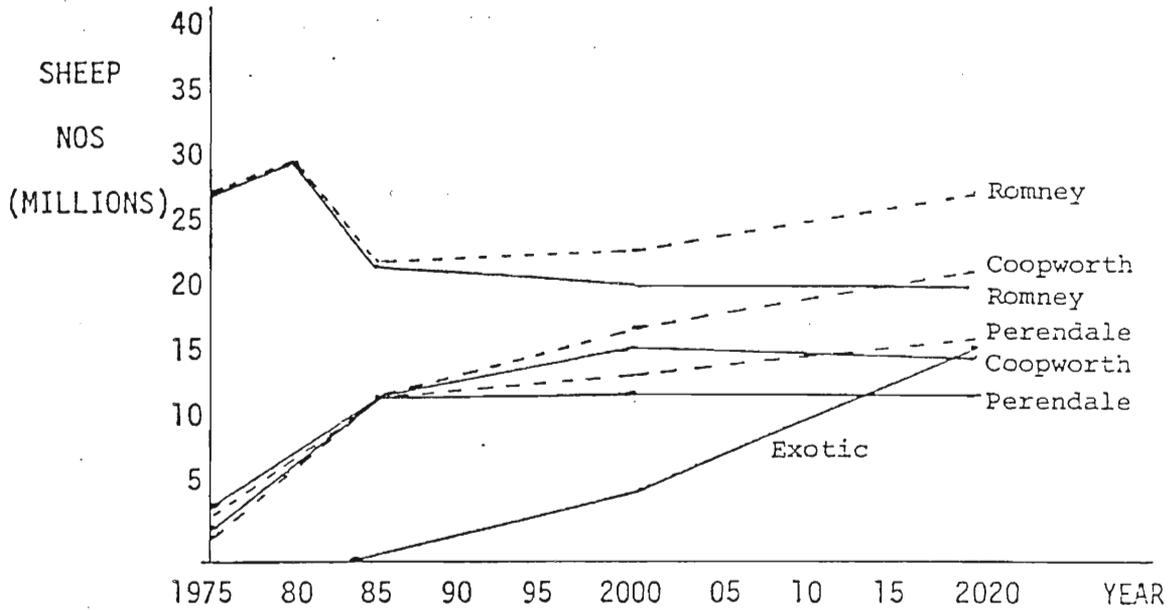
Buyers of our lamb from around the world will be quick to spot the advantages of a product that has larger muscle cross-sections, with less subcutaneous fat, and less intermuscular fat.

Both Texel and Oxford sires will allow lambs to be grown to significantly heavier weights than is possible at present (see Fig. 1) and if, for example, with the Texel there was an average increase in carcass weight of 3 kg, then without any premium paid for the much improved carcass conformation, the weight of lamb produced could be increased by more than 20% from the same number of animals.

With sheep numbers at present declining due to low prices being paid for lamb, this is indeed an exciting possibility.

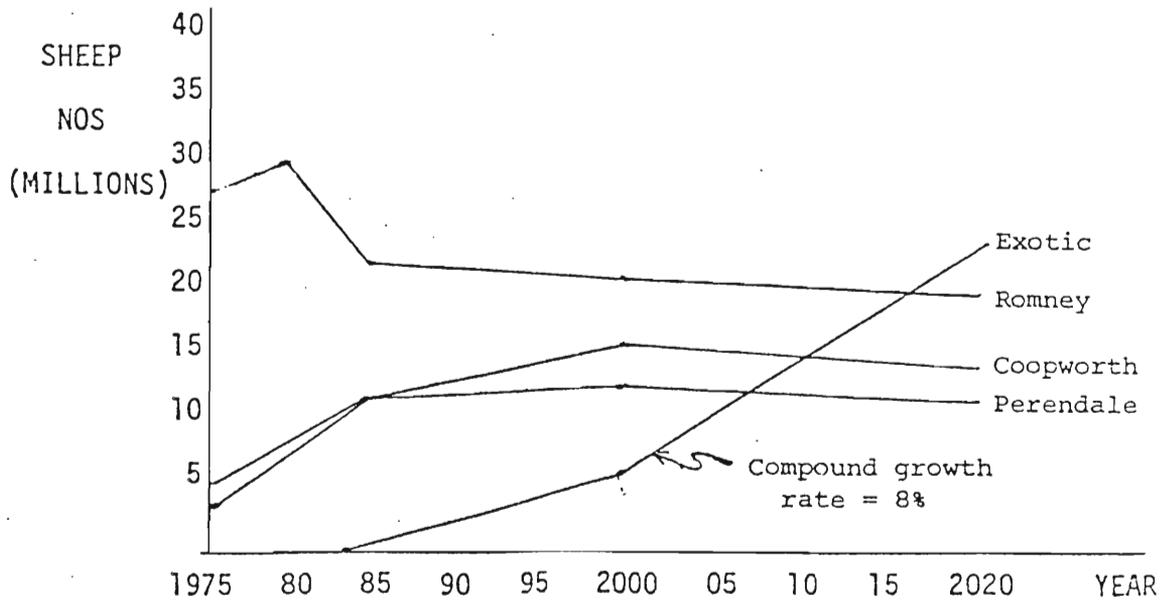
If exotic sheep are introduced into our National flock, the projected numbers are as follows:

FIGURE 4.2 PROJECTIONS OF BREEDING EWE NUMBERS - BY BREED WITH EXOTICS 20% OF NATIONAL FLOCK BY 2020*



* The dashed lines represent projections of breed numbers assuming that no exotic crosses enter the national flock, i.e. the "WITHOUT" situation.

FIGURE 4.3 PROJECTIONS OF BREEDING EWE NUMBERS - BY BREED WITH EXOTICS 30% OF NATIONAL FLOCK BY 2020.



It can be seen that it will take some time for exotic sheep to have a major impact on the National flocks. However, there will be sufficient numbers coming forward prior to the year 2000 to be used by the Meat Industry to satisfy specialist markets.

To conclude, I have outlined the history of the N.Z. Sheep Industry and the N.Z. Meat Industry over the last 156 years. As with all industries, the passage of time has been marked with change.

The marketplace is now indicating very clearly that it wants further change in the form of a high yielding, well conformed, lean lamb. The customer is always right and as an industry, we must supply what is required.

On April 1990, the N.Z. farmer will get the opportunity to farm exotic sheep, and assess them under local conditions.

If U.K. and N.Z. trial results can be repeated under commercial conditions then:

EXOTIC SHEEP WILL BENEFIT THE N.Z. MEAT INDUSTRY.

ACKNOWLEDGEMENTS

Ruakura Agricultural Research Centre, Hamilton.

Lamb XL, Palmerston North.

Meat and Livestock Commission, Great Britain.

P.P.C.S., Dunedin.

N.Z. Meat Producers Board, Wellington.

The Meat Industry Research Institute, Hamilton.

M.A.F. Qual., Wellington.