Impressions of the New Zealand Sheep Industry

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IMPRESSIONS OF
THE NEW ZEALAND SHEEP INDUSTRY

BY

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"... Part of it also may be a difference in attitude of a New Zealand farmer and how he looks at the situation. When you arrive at a change in attitude—to where you think you can do some of these things—you find it much easier to do them than if you are skeptical about whether they can be done or not. There is tremendous potential if we can achieve this change in attitude on the part of our sheep farmers."
FOREWORD

This is a report of sabbatical leave taken in travel to New Zealand to study the sheep and pasture industry in that country. It gives impressions gained on a 3½ month visit in 1966, during which my family and I spent six weeks at Christchurch, six weeks at Palmerston North, and two weeks at Hamilton, near Ruakura Agricultural Research Center.

The trip was rewarding, both personally and professionally. My work in Douglas County is concerned with forage production on hill lands and the grazing of livestock on these lands to consume the forage that is produced. A great deal of the information which I gathered is readily applicable to the conditions in Western Oregon and comparisons are drawn throughout the report. Besides providing readily adaptable techniques, it was also inspirational in raising goals of the potential production of our livestock and forage production.

Considerably more was observed than will be put into this report. I obtained printed matter about items that are of interest and some of it is referred to in the report. This report deals almost exclusively with sheep management, production, and utilization of forage. I observed dairying, beef cattle production, grain growing, the lumber industry and various other items, but will report them separately, as appropriate or useful to Douglas County and Oregon producers.
NEW ZEALAND AND OREGON IN COMPARISON

New Zealand is approximately the size of the State of Oregon. Population is similar in total numbers and rate of growth. Although New Zealand extends over more latitude, comparable to Seattle to San Francisco, the major portion of their agriculture occurs in a latitude equal to that of Oregon. The marine influence in climate is stronger in New Zealand with less extremes in temperature. The major difference and asset is in rainfall distribution. Rainfall in amounts similar to western Oregon is either well distributed throughout the year or as on the Canterbury Plain, the summer drought is normally not so extreme or prolonged.

Oregon runs about 500,000 sheep at the present time, whereas New Zealand on the same land area runs close to 60 million, or 100 times as many as Oregon. The New Zealand economy is based primarily on agriculture: meat, wool and dairy products. Most manufactured goods must be imported into New Zealand, as very little manufacturing takes place there.

The value of sheep in New Zealand compared to the United States is a great contrast. At the time of my visit, lambs in New Zealand were selling for about 17¢ a pound dressed, whereas lambs in Oregon just prior to my departure had been bringing 22¢ liveweight. To compare these on a dressed basis would mean close to 50¢ dressed for American lamb. Wool prices in New Zealand were about 50¢ to 55¢ a pound to the grower, while our wool pool sold for 67¢ in April prior to my departure. The quality of the wool pack which the New Zealander would be selling is superior to the wool which we were selling. The New Zealander would be selling wool which is graded and skirted compared to our wool which is neither graded nor skirted. In addition, a great variation of fleece count exists within flocks here compared to New Zealand.

Price of lamb and wool is based on overseas markets. The lower prices have a strong influence on the practicality of techniques that the New Zealanders use, and has forced them to be much more efficient than the average American sheep producer to achieve the same economic goal. We base our production primarily on lamb, whereas the production of lamb and wool each share the spotlight in New Zealand.

GENERAL IMPRESSIONS OF NEW ZEALAND

My first major impression was of the shepherding ability of the average New Zealander. He handles 1000 to 2000 ewes quite easily, normally working about 8 hours a day, five days a week, with the exception of lambing time. Carrying capacities per acre were quite astounding also, running all the way from a half ewe to the acre on some of the unimproved land up to as high as ten ewes per acre in the best areas.
The second impression which I believe is very important to Douglas County and Western Oregon is the fact that most of the improvement in the number of stock that are carried per acre (from 2 ewes to the acre up to the 8 - 10 ewes per acre) is practically all done by management. In most cases the increased stocking was due to management and very little to additional use of fertilizer or improved pasture species.

This is not to say that high stocking rates can be achieved on unfertilized bentgrass or native annual grasses. Clover is an essential ingredient with enough fertility to get production underway. A grass capable of taking advantage of the improved fertility from clover is necessary. But once the pasture components are present and stocked accordingly, the further and often dramatic increase in carrying capacity is obtained by management of pastures and livestock.

The third impression which I am sure can be very helpful in Western Oregon was that New Zealanders do a tremendous job of utilizing the feed that they produce. Just how they do it probably is due to a much more intensive level of management which is brought about by greater subdivision and management of the flock. Details of this will follow.

Because of the tremendous amount of research put into the sheep industry in New Zealand and because most of the operators are full time sheep men, the level of management is superior to that of the average operator in Douglas County. The New Zealander knows how much he wants to feed his sheep and what time of year he wants to feed it. He has developed feed for these periods to satisfy the needs. This has led to a large and efficient sheep operations compared to our standards. Because of the high cost of labor, the New Zealander has had to develop techniques for handling large numbers of sheep with as little assistance as possible.

**LAMBING TECHNIQUES**

I observed two general techniques of lambing carried on in New Zealand. One is called "shedding off". I found this in use on the Canterbury Plain. Under this system, a number of small pastures are designated as "autumn saved pasture" specifically for lambing. At least four are essential and in most cases more are useful in carrying out the technique. The whole lambing flock is moved into one of the pastures at the start of the lambing season. Then morning and evening, or once a day depending on the number of lambs that are being dropped, (about 30 ewes per time is considered maximum) the unlambed ewes are driven out of this pasture and into the next one, leaving behind the ewes that have lambed. If this is done soon enough after the lambs are dropped, the lambs do not move very far and the ewes will usually stay with them. Care is taken to check the unlambed ewes as they go from one paddock to another to be sure that no ewe has left her lamb behind or is having difficulties lambing and is still in with the main flock. After the unlambed ewes are driven out, the shepherd can visit each of the lambs left in the pasture to be sure that everything is going properly. If lambs are weak and need help, they can be given the necessary help quite easily.
This insures that the shepherd looks at every lamb when it is born, and avoids duplication of effort. In succeeding days this means that he does not look at lambs wondering if they are new lambs or if he has seen them before. In a day or so when the lambs are big enough to move, they are driven out of the pasture and into another area where they are set-stocked with other ewes with lambs. This leaves the pasture free for the unlambed ewes to come into again within a day or two.

The "shedding off technique" probably could be used by farmers in Douglas County and other parts of the United States, particularly in areas where we have some winter pasture. Economics dictate that we can afford to use more intensive care at lambing than the New Zealanders because of the return that we will get for the effort that we put forth in saving lambs.

Another system of lambing often used is "set stocking" and pasture visits each day. In this case, ewes are stocked on a pasture and the shepherd visits each pasture each day to check the ewes to see if any difficulties are occurring and to care for any lambs at that time.

Some shepherds feel they can handle more by one system than the other, and this seems to vary with the individual. It appeared to me that the "shedding off technique" probably gives the chance to do more intensive shepherding than the "set stocking technique" and with less waste of time going back to check ewes that have lambed in previous days. The New Zealanders have no lambing sheds capable of holding the stock. They usually have a hay shed where they put a few ewes, but in most cases not very many of these could be taken care of intensively. The incidence of twinning is not very great in New Zealand and the effort put forth to save individual lambs is not nearly as great as on some operations here in the United States. (This is probably dictated by the value of lambs at sale time in the two countries).

HELPFUL GADGETS AT LAMING

The New Zealander has developed a lot of devices and tools to help him in his lambing management. When he goes on a lambing beat, he carries a small kit with all the tools in it. Included in his kit is disinfectant, antibiotic (usually penicillin), bearing retainers, a lamb reviver, needles and sutures, lubricant and string and any other items which he might feel were useful.

The "lamb reviver" is a small plastic dispensing bottle with the bottom cut out and with a catheter tube attached to the top which is used for feeding weak lambs. Warm milk from the ewe or from a thermos can be force fed by inserting the catheter tube in the lamb's stomach through the throat. The open bottom allows the milk to run into the stomach by gravity when the bottle is raised.

"Bearing retainers" are plastic devices which are used to repair uterine prolapses. The prolapse is returned to place and the bearing retainer then holds it in place. It works quite satisfactorily as long as it is used early enough after the prolapse begins to occur. The ewe can lamb past it quite readily. They are inexpensive and quite successful. The shepherd also carries a crook for catching sheep which is about five feet long and light so it is easy to handle and is very
useful. Most I saw were for catching by the neck.

The dog is inseparable from the shepherd on the lambing beat. A good quiet dog that is well mannered can be extremely helpful. Many of these dogs are trained to a high degree. I saw "strong-eyed" heading dogs used at lambing to help catch ewes with problems or for recording birth dates. They do an excellent job of working with the shepherds at lambing, moving quietly, getting the job done with unduly disturbing the ewes.

The many devices the New Zealanders use and the way they use them are all designed for efficiency to cut down on the amount of labor that must be put into a sheep operation. A good dog is one of the best labor saving devices in the world for handling sheep and also one of the cheapest. All they ask for is a little bit of love and food.

Many New Zealanders ride a mechanical conveyance so that they can carry with them the ewes and lambs that are having difficulty. This can be either a tractor equipped with a rear end hydraulic crate, a four wheel drive pickup or a small vehicle they have developed called a "gnat", (a three-wheeled cart with a low center of gravity which travels over the hills quite easily). Motorbikes are also used and quite effectively. Vehicles save steps for the operator and cover the ground faster. Most are used to transport sheep that need additional care. This saves considerable time because the shepherd can "carry his troubles with him".

Many of these labor saving gadgets and ideas the New Zealanders use could be just as helpful to us in the United States. More effort should be spent in Oregon in trying to inform producers of methods of improving efficiency in their lambing operations. Bearing retainers and lamb revivers are used to accomplish, rapidly and simply, tasks that would take a lot of time were these items not available. The shepherd's crook extends a man's arm and makes it easier for him to catch problem sheep. This can save steps, particularly when used with a good dog.

**LAMB MARKING OR CASTRATING**

The methods of marking lambs in New Zealand are quite similar to those used in the United States, but it appears that the emphasis is a little different. I saw several methods used in the time I was there, including the use of the elastrator, the knife, a hot iron, burdizzo, and emasculator. The two most common ones are the elastrator and the knife. Several knowledgeable people in New Zealand told me that probably 60 percent of the lambs in New Zealand were marked with an elastrator. In our country in past years, veterinarians have discouraged use of the elastrator because of the possibility of tetanus. Veterinarians in New Zealand whom I talked to were generally agreed that many more lambs were lost from the use of a knife than an elastrator and tetanus. They felt that the incidence of tetanus was highly over-emphasized. If this is a problem on a particular property, it can be handled quite readily by pre-lamb vaccination of the ewe with a tetanus toxoid. The main losses occurring from the use of a knife seem to be hemorrhage. In visiting with veterinarians, they felt that 1 to 2 percent might be lost annually from marking with a knife, whereas this loss didn't occur with
the elastrator or with a hot iron. The difficulty with a hot iron, of course, is the need for heat at the site.

**PASTURING SYSTEMS FOLLOWING MARKING**

Following the marking operation, the flock is "set stocked" on the pastures with very little rotation up to the time the lambs are marketed. The age to marketing was not too different from Douglas County, although the lambs would be marketed at considerably lighter weights. Carcasses range from 28 to 34 pounds in the standard market weights with the emphasis being on the lighter carcasses.

The Southdown cross lambs generally tended to flatten out quite well at this weight with some emphasis by export companies to get lambs marketed before 30 pounds carcass weight. When Southdown lambs got heavier than this there seemed to be excess fat, which in some cases knocked them out of the export grade. Overfat lambs are quite a problem in New Zealand. This is determined by the markets where the New Zealand lambs are sold. Most go to England. The emphasis is on a lean carcass with a rather thin fat covering. The market lambs look quite good, but didn't appear to conform to high choice or prime lamb classification under our grading system.

Lambs in New Zealand are marketed on carcass weight rather than on live weight. Each farmer's lambs are identified separately when they come into the freezing works and go through the works separately. Carcass weights are taken, hot, at the end of the killing chain. The farmer is paid on the carcass weight and grade of the lambs as they go through the freezing works. After the lambs are slaughtered they are put on a chilling floor, held at about 56 degrees. Then 12 to 24 hours later they are put into sharp freezers and frozen solid. They are kept frozen solid until they arrive on the butcher's county to be retailed to consumers. This is the general practice throughout New Zealand.

Most New Zealand lamb is exported to overseas markets; consequently the name freezing works rather than slaughter houses. There was some talk, while I was there, about requiring export lambs to be chilled for seventy-two hours before being put into the freezers. From research results here and also in New Zealand, this probably would result in more tender meat which would be beneficial, I believe, to the New Zealand overseas trade. New Zealand processing plants kill up to twenty thousand lambs a day. Increasing chilling time would mean a terrific expenditure for increased chilling facilities. For example, the Longburn Freezing Works, on the North Island, is an average works and kills at the peak of the season about 10,000 lambs a day. This involves chilling space for at least 30,000 lambs for seventy-two hours, and would amount to quite an expenditure. The Longburn Freezing Works had three chains operating, the fastest of which, involving 39 slaughtermen, would be expected to kill 3,500 lambs a day. It also had complete slatted floors where some 7,000 or 8,000 live sheep were held under cover at night for the next day's kill. Emphasis is put on cleanliness of the sheep before they are killed and also on the slaughter chain area.
The New Zealand sheep grower cannot send dirty, taggy lambs to slaughter. If they are taggy, he is required by law to tag the lambs before they go to the works for slaughter or they will be sent back to him.

Generally, about the time that the first pick of lambs is taken from the ewes, most of the rest of the lambs are weaned. Research in New Zealand shows that these lambs can be weaned at eight to ten weeks and do quite well on good pasture. The pastures at this season of the year usually are quite lush and growing well. If proper emphasis is put on parasite control and adequate feed of high quality, the lambs seem to do very well. Most lambs do not make the kind of weight gains that we expect from our better flocks in the United States. Probably this is due to the number that are run per acre, and to the breed of sheep that make up the majority of the flock. Many of the lambs at market age would be 100 to 120 days old when the first pick was taken at 65 pounds live weight.

When New Zealanders wean the lambs, they tighten the ewes up (increase grazing pressure) to clean up other pastures. They force the ewes to take off rough forage growth that they would not take off so long as they had lambs with them and were being "luxury fed". Early weaning also has a tendency to cut down on the parasite burden that is being offered to the lambs. The lambs at this stage should not be carrying a very great parasite burden. But many of the ewes carry a reasonably high parasite burden, and if these are passed over the pastures it can result in more parasite problems on the lambs.

Tightening up the ewes at this time of year influences the amount of feed that can be saved for flushing and later summer pasture or hay. This can increase the number of sheep that can be carried on a given property. If the ewe is not contributing much milk to the lamb, then certainly the lamb is better off being weaned and put on good pasture. The feeder lambs, or store lambs as they are called in New Zealand, often are kept as long as they do not interfere with the pasturing program for the ewes. If surplus feed is available, store lambs often will be brought in to the property to utilize it. These usually come off the rougher country and are purchased by fat-lamb farmers who have already fattened out their own lambs and wish to purchase more to utilize the feed they have available. Lambs fatten out quite well under these conditions - even on relatively dry feed, provided it is short and nutritious.

When talking about early weaning of lambs or selling feeder lambs or fat lambs in Oregon a lot of things are involved. Every grower has various alternatives he should examine in light of his own operation to get the greatest return for the effort expended. He can control the lambing date. If he lambs early this can mean more winter feeding because ewes close to lambing and ewes with lambs at side need to be fed better than ewes 6 weeks or more away from lambing. This then can have quite an influence on the amount of feed that must be saved or purchased for winter feeding.
Weaning the lambs early in the spring can create an additional amount of feed, which could go to feed a greater number of ewes or could be cut for hay or silage for late summer or winter use. Grazing hard may eliminate some of the need for burning grass and brushland with a high enough level of stocking. (Dry ewes can "live on fresh air and scenery at this season") The surplus feed could be cut and stored as hay for feeding back to more ewes the next winter.

Weaning early also can save a limited supply of good feed for the lambs that are still growing. Once the feed becomes dry, the lambs should be sold, as they are not going to go ahead. Fat ewes in the summer time waste feed. It takes energy to put on fat and may cause difficulty at breeding time.

Selection for faster gaining lambs can materially shorten the length of time that the lambs need to be on the pasture. This would leave the alternatives of later lambing, growing larger lambs, or increased numbers of sheep.

Oregon producers should consider raising more feeder lambs as an alternative to producing fewer fat lambs off of grass. The difference in price between fat and feeder lambs is not very great and possibly the extra pounds of lamb that are produced would more than make up the difference.

With our feed production pattern, a high rate of twinning and raising lambs to as large a market weight as possible during the green feed period in the spring might not rule out a high stocking rate and fat lamb production.

MARKETING EWES

Marketing ewes in New Zealand is different and on a much greater scale than in the United States. Many New Zealand farmers carry the ewes not more than four or five years and when they get to be full mouthed, sell them to some of the lowland farmers. These farmers pick them up for one or two years to use as fat lamb mothers. They are crossed with a mutton ram of some type, generally Southdown. After one or two years, these ewes are sold to the freezing works at a reasonably good price.

In contrast most Oregon sheep farmers figure that if they can get another lamb crop from ewes they will make more money even if half the ewes die than by marketing the ewes as culls. Ultimately when we achieve full stocking a good young ewe may make enough more money than older ewes that more frequent culling of older ewes will pay. Young ewes require less labor for care.

I did not see any of the "ewe fairs", as they are called in New Zealand. I have read quite a bit about them and it is an interesting way to market. Great numbers of ewes which are to be sold come in from the country in the fall to the ewe fairs and large numbers of sheep are sold, in their pens, to the highest bidder. The bidders are taken around to the pens to bid on the different groups of sheep and apparently even a small sale will involve several thousand head.

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New Zealanders market through "stock firms". These are companies that supply almost everything to the farmer and buy everything that he has to sell. These stock firms generally are private companies. They will not only buy replacement sheep for the farmer, if he wishes them to do so; but they will also buy his fat lambs, his wool, and any grain or hay that he has to sell. They will in turn, offer for sale to him any of the products that he generally needs for his farm operation, including medicines, tools, feed, and other farm supplies. In some cases, they even go into groceries and fuels. This probably is more necessary in New Zealand than it is here because of the export business. These firms export the lambs and sell them on the English market, which would be impractical for individual growers.

It was interesting to note that the basic price of fat lambs and wool in New Zealand is determined by the English market. The Smithfield Market in England pretty well sets the price, and the New Zealander is paid for his lambs the Smithfield price minus freight, adjusted for estimated value changes during the approximately three months from when the item is purchased until it will appear on the English market. The big difficulty, of course, is being many thousands of miles away from any market willing to take their product.

**BREEDS OF SHEEP IN NEW ZEALAND**

Almost 75 percent of the sheep in New Zealand are Romney. Corriedales found primarily on the Canterbury Plain on the South Island of New Zealand make up approximately 5 percent of the total sheep population. Merinos are run strictly in the high country and make up about 2 percent of the total population. Southdowns, used primarily as fat lamb sires, make up less than 2 percent of the total population of sheep in New Zealand. All of the other pure breeds of sheep comprise less than 1 percent of the total and the rest of the population is "half-breds" and crossbreeds.

Romney sheep in New Zealand are quite a hardy sheep, producing a good clip of wool of fairly high quality. It probably will continue to be the leading breed. The New Zealand Romney has been bred for the characteristics desired there. Its adaptability as such for our purposes, in my opinion, has some rather serious limitations. Romney wool is in quite low demand here in the United States because it is rather coarse. This has an influence on the income from a sheep.

The Romney sheep is not noted for its prolificacy, averaging in New Zealand just about one lamb per ewe, or about 100 percent lamb crop. It probably has some potential above this by management, but not very many farmers on straight Romneys are getting much more than a 100 percent lamb crop. This, I think, is a very serious limitation under our conditions. They are making attempts to increase the lambing percentage, but it probably would be easier to do this through the introduction of other more prolific breeds. In addition, the Romney seems to be a rather slow maturing sheep with a relatively low rate of gain compared to some other breeds. They certainly do not have the gaining ability of some of the other breeds of sheep that are used in this country, particularly the Hampshire and the Suffolk. On the west coast of Oregon quite a few Romney's are raised. Though we have imported some New Zealand Romney's recently, still the typical Romney in New Zealand and the typical Romney in Oregon are quite different. Many ewes in the coastal areas of southern Oregon are Romneys.
or of Romney ancestry. Despite the fact that the feed conditions during the spring months are almost ideal for sheep production not many of the Romney lambs reach market weight and are sold as fat lambs. In Douglas County probably the greatest contribution that the Romney makes is as a part of the crossbreeding program that contributes hybrid vigor to the production of market lambs. A good share of the ewes in our area are crossbreds of Suffolk and Romney. These are then bred back generally to the Suffolk for what appears now to be nearly an ideal market lamb. The crossbred has a tendency to be more prolific than the straight Romney. Each 10 percent additional lamb crop would be producing an additional approximate 10 pounds of lamb per ewe per year. At 30¢ prices this is $3.00 per sheep.

There are probably some breed difference in milking ability, which would figure into the most efficient weaning age for lambs. Apparently, some of the down breeds are better milkers late in the season and, consequently, contribute more to the production of fat lamb than the Romneys do under New Zealand conditions. This would have an influence on weaning age. More research needs to be done on this.

The Corriedale sheep on the South Island of New Zealand mostly are limited to the Canterbury Plain area. The Corriedale appears to be slightly larger than the Romney, clipping a slightly finer fleece of about the same weight as the Romney and appears to have a 10 - 15 percent greater lambing percentage than the Romney. Again, they do not seem to have the gaining ability of some of the English breeds of sheep.

Merino sheep, used in the high country, are particularly well adapted to the conditions under which they are run. They are hardy sheep, being able to put up with a great deal more adversity than most of the other breeds of sheep. While they are not a very prolific sheep, they can survive under tough conditions and still produce a good clip of wool. They probably have no adaptation to western Oregon conditions because of poor mutton characteristics, fine wool, and low prolificacy.

The Southdown sheep of New Zealand are a larger breed of sheep than the ones here in the United States. However, it is my opinion they have some of the same faults. They are not a prolific sheep, they tend to be a wastey sheep at the weights at which we market. Even in New Zealand the growers feel they must market the Southdown or Southdown Cross lambs at a very light weight to keep from getting carcasses that are too fat for export.

A new breed called the Perendale, a cross between Romney and Cheviot, seems to be doing a good job on some of the rougher country in New Zealand. Perendale sheep are used in New Zealand on some of the rougher country because of their ability to get around over hills and better ability to lamb, without assistance. They still produce wool about as well as the Romney.

The general quality of the minor breeds did not appear to be as good to me as many of the breeds that are used in this country and this probably is because of the very low numbers in comparison to the total flock.
Only one of the minor breeds, the Border Leicester, impressed me as being useable under our conditions. It may have some real value to us in cross breeding, though not a very hardy sheep as a purebred, it is extremely prolific. When used in a crossing situation where the rams are crossed with Romney, Corriedale, or Merino ewes, they seemed to really help the twinning percentage. In addition, they are a much better shearer than many of the English breeds that we use. The Border Leicester is larger than most of the other sheep breeds that I saw in New Zealand. Apparently they are good mothers with a lot of milking ability.

Few Border Leicesters are in the United States at the present time. There are some in eastern Canada. North Dakota State University has done some crossing that look very promising and in 1972 they imported a Border Leicester ram lamb from New Zealand for further experiments. This was the only breed of sheep that I felt really had a lot to offer us of the sheep breeds that I saw in New Zealand.

SHEARING

With 60,000,000 sheep to shear in New Zealand, the art is important. With the variation of conditions over the islands, some shearing is going on during most seasons of the year. This gives New Zealand shearsers a chance to really work at their profession, perhaps more so than in the United States. The regular shearing comes in the spring, varying from the north part of the islands in the low country to the South Island high country extending over a long period of time. In addition some flocks are shorn twice a year, shorn prior to lambing or regular tagging of the ewes must be done prior to lambing.

Because of considerable work done by a few people like Godfrey Bowen, field director of the New Zealand Wool Board, the shearing industry in New Zealand has gained stature over the past few years. This has influenced the reputation of the shearsers and has led to much better quality work. Shearing conditions on the farms are much improved over what they were a number of years ago because of the upgrading of the profession. Many New Zealand wool sheds are excellently constructed for ease of handling the sheep and the fleece. This has led to better shearing conditions for the shearsers, and consequently, to greater speed and quality of their work. A very strong teaching program in shearing also has improved both quality and speed. Shearing schools and instructions are given at many places on both North and South Islands of New Zealand. This is all under a central head at the New Zealand Wool Board and is under the direction of Godfrey Bowen.

Mr. Bowen at one time was recognized as the World Champion Sheep Shearer and has made some records that look fantastic compared to the number of animals that the average shearer shears in the United States. Mr. Bowen's outstanding record was 463 full-wool Perendale sheep in a nine hour day under average shed conditions. Since that time, some New Zealand shearers have bettered the mark. Part of this is due to technique, but probably most of it is due to excellent schools and shearing instruction. The average shearing school in New Zealand takes about two weeks, during which time shearers must meet certain proficiency standards not only for speed but for quality of work. These are also broken down into classes for novices and for different grades of experienced shearers.
Instructors in the courses generally are outstanding shearers themselves and they have, in turn, been instructed in one basic technique which most shearers in New Zealand use.

A lot of emphasis is put on the quality of shearing. Several things are important. The fleece must be taken off the sheep in one complete piece. The wool must be taken off cleanly so as not to leave tufts and high spots, and the shearer must not go back the second time and cut off patches that he missed the first time, as this creates second cuts. The shearer must not cut the sheep. While some nicks and cuts are not very harmful in themselves, difficulty is encountered from cuts, such as fly strike and blood poisoning, and it is important that the shearer avoid them. Quality of shearing is stressed first and speed is second, but the New Zealanders have combined these to a large extent to where they are recognized as some of the outstanding sheep shearers in the world.

After the fleece is shorn from the sheep, a "fleeco" picks up the fleece from the floor and throws it out on a slatted table. It must be thrown out with the flesh side down so it lies out flat like a rug. To do this, it must be kept in one piece during shearing. The wool classer goes around the fleece taking off all the sweat locks, dung tags and off-grade pieces of wool. After this, the fleece is graded and rolled and put into the proper bin. It goes from there to the wool press, where it is baled into bales of like quality wool. These are square bales weighing about 300 pounds each and are put up usually with a hydraulic press. From there, they go to the wool buying warehouses where most is sold at auction. The off grade pieces, sweat locks, crotchings and so forth are each baled separately and are sold according to the kind of wool that they are. This has resulted in a very high quality raw wool product coming out of New Zealand.

On the American market it is questionable at the present time whether the industry would be willing to pay the difference in the cost for preparing American wool in this manner. Here pool lots of wool, including quite a wide variety of grades, will often bring more money as "original bag" wools than they would as graded fleeces. This probably has hampered improvements in the shearing and wool handling process in the United States.

New Zealand wool sheds are well constructed buildings designed for efficient handling of the sheep. In comparison to most American wool sheds that I have seen, these buildings are far superior. Throughout a good share of the wool shed where the sheep will be standing the floors are slotted. This is to keep the sheep clean and the wool clean before and during shearing. The direction of slats is influenced by the way in which the sheep will be moving through the area. The slats are laid parallel to the movement of the sheep. This does not allow the sheep to get a good foothold against anything and consequently makes for easier handling. The gate systems within the wool shed also are set up so that the sheep will move through them the easiest way possible. One innovation is a "lift-swing gate". These gates not only swing in a 270 degree arc, but also may be lifted up and swung back over the backs of the sheep and pushed down behind them and used to push the sheep forward. These are counter balanced and are a very efficient type of gate to use in a close sheep handling area. These ideas have been used and can be observed at the Douglas County Demonstration Farm.
The shearing board itself is of good flooring material and smooth. It can be swept and kept clean for wool handling. All of the rest of the equipment is permanent in the sheds and a three stand shed generally would be run by a shaft and clutch type of arrangement with one central motor. In addition, grinding equipment for the shearing gear is always present in the sheds.

New Zealand sheds require and have a generous amount of wool handling space. A wool press for baling wool is present in all wool sheds. In many of the sheds that I visited, running water is provided for the shearers. Most New Zealand sheep shearers wear sack moccasins or some special type of foot gear. This makes it easier to grip the greasy floor and avoid slipping.

Note: This is not to say an expensive wool shed is necessary or desirable. Emphasis should be on labor saving. When possible, multiple use should be made of a facility. Ease of handling needs to be stressed. If reasonable capital can substitute for labor it usually pays.

PRE LAMB SHEARING

Pre-lamb shearing of ewes is done in quite a few places. This has some advantage and disadvantages. The biggest disadvantage of pre-lamb shearing is that the ewe requires more feed just to maintain body temperature. This shearing is done while the weather is still rather bad. In the event of a bad storm shortly after the ewes are shorn, they need protection because they do not have adequate insulation for the first week or two after they are shorn to survive even a moderately bad storm. This means adequate shelter to take care of the ewes. In the event of a fairly bad, prolonged storm, facilities would have to be available not only to shelter the ewes, but to feed them to prevent pregnant ewe paralysis (pregnancy toxemia). Studies in New Zealand indicate that when ewes are pre-lamb shorn, the feed requirement is raised about 50 percent.

In Oregon, where our short feed supply period is the winter time, pre-lamb shearing probably would cause more problems than it would solve.

Some of the advantages of pre-lamb shearing of ewes, however, should be considered. One of the major advantages of pre-lamb shearing is that when a shorn ewe goes to lamb she will have a much greater tendency to seek shelter, which gives the lamb better chance for survival. It also cuts down on the need for shepherding at lambing time for those ewes that get on their back or side and can't get back up again (cast). Another advantage has been pointed out by some research results of Don Torell of the University of California Hopland Field Station. This is in regard to wool quality. Mr. Torell's work showed that most breaks in the fleece occurred fairly close to lambing. Though lambing does not cause all breaks, winter feeding, infections and disease at lambing time might all contribute. If such breaks occur and the ewe is pre-lamb shorn, this would put the break on one end or the other of the fleece rather than in the middle.

Some farmers in New Zealand also practice twice yearly shearing, which cuts down on some of the problems such as cast ewes (on their back), very taggy sheep, and etc. It does in many cases create a little lower value fleece, which should be considered.
Considerable research work has been done in New Zealand in regard to breeding sheep for reproductive performance. Most of the emphasis has been put on the amount of wool produced. Little emphasis has been put on production of additional lambs. There has been considerable research on the physiology of reproduction and trying to determine a ewe's fertility early in her life. Some work by Dr. T. S. Chang, at Massey University Palmerston North, New Zealand indicates that oestrus cycles in ewe lambs pretty well designate the fertility of the ewe in later years. The greater the oestrus activity as a ewe lamb, the better the fertility level will be in the sheep in later years.

Dr. Ian Coop, of Lincoln College, Canterbury New Zealand has studied flushing procedures and live weight in sheep and their relation to the lambing percentage. Dr. Coop feels that live weight in sheep is more important in determining lamb numbers than any flushing program. From his work, he feels that each ten pounds of additional live weight over normal condition on the ewe at breeding season will result in approximately 6 percent more twins. This also will result in one to two percent less barren ewes. As far as flushing response goes, Dr. Coop did not feel that flushing had much influence on the production of twins. He rated flushing feeding response about 1 percent per week prior to the introduction of the rams.

This work would not appear to me to be as relevant here in Oregon. Don Torell at the University of California Hopland Field Station, carried out trials that would indicate that flushing may have a tremendous effect on the percentage of twins. Perhaps the difference in the breeds of sheep or the conditions under which they are run might influence the situation. Interestingly the work by Dr. Coop and the work by Don Torell both were cases done with Corriedale sheep. The main difference was that the sheep at the Hopland Station were bred on dry native pasture, whereas the sheep in New Zealand usually were bred on either Lucerne (alfalfa) or clover pastures which in most cases were green feed. This could indicate a protein response on dry pasture and a lack of it on green pasture. Recent work by Torell would confirm this.

Some other work that Dr. Coop has done which I think might have some worthwhile application in this country has to do with synchronizing ewes so that they all come in heat at the same time. A lot of research in this country has dealt with the use of hormones to bring the ewes into oestrus cycle at the same time. Dr. Coop has done this with management apparently quite successfully in many cases. The procedure, in rather simple terms, is to determine when the silent oestrus cycle for the particular group of sheep begins. Rams are kept entirely separate from the ewes, being careful to keep them far enough separated that even the odor of the rams does not come to the ewes. When the silent heat period begins, the rams are introduced to the ewes for a period of from 10 to 22 days, after which time they are removed. Usually the rams are removed at the time that they begin to breed a few of the ewes. The rams then are kept separate from the ewes usually for one to two heat periods when the rams are again introduced for the regular breeding season. Apparently, if the ewes are in or approaching the silent heat period, the introduction of rams at this time can bring all of them into heat within a very few days.
which pretty well synchronizes or groups the heat cycles and consequently will end up grouping the lamb crop.

How effective this might be on a group of ewes of mixed breeds might need some investigation, but this could have some application in Oregon on our flocks for grouping lambs.

Crossbreeding in New Zealand appears to be showing some real progress. As mentioned previously in this report, the crossing of Border Leicester rams on Corriedale and Romney ewes does produce a ewe that is a much superior mother as far as prolificacy and fat lamb production is concerned. Most of the crossbreeding that is done, however, is done with the idea of crossing mutton rams onto Romney ewes or Corriedale ewes for fat lamb production in the low land areas. This is pretty well stratified. The Hill Country farmer produces straight bred lambs, most of which are store lambs (feeders), which then are purchased by the fat lamb farmer to fatten out after his own lambs are gone. The older ewes from this hill country are then sold, usually to the fat lamb farmers on the lower, easier country. Here they are crossed to mutton sires for fat lamb production for one to two years, after which they are sold for slaughter.

The number of ewes per ram is pretty much dependent upon the type of country over which the sheep are ranging. On the rather rolling hill country that isn't too terribly steep, one ram is used for about forty ewes. Down on the flatter farms under fairly intensive production, one ram is used for about each seventy to eighty ewes, while under very intensive management conditions, one ram can be turned in with up to 150 ewes.

The size of the paddocks (pastures) and the stocking rate of the sheep have a tremendous influence on the number of ewes that one ram can be expected to breed. New Zealand research showed an exceptionally good, vigorous ram put with 300 ewes got 260 in lamb in one heat period.

**FEEDING NEEDS AND HOW THEY ARE MET**

Research workers in New Zealand have worked out nutritive needs for a flock of sheep during all seasons of the year. This gives the farmer something to shoot at to determine the amount of feed that he will need for any particular season. He is able to produce this feed with techniques and plant species that have been developed. He keeps his flock in good condition, yet never seems to overfeed, even though he may have a surplus of feed on hand. In most cases he tries to utilize the surplus feed with some other livestock so as to maintain the quality of pasture that he would like to have for his ewes. He feels that quality of pasture is more important than quantity in many cases and has some pretty interesting evidence to prove this.

The emphasis on sheep management in New Zealand is to utilize all of the feed that is produced. Because of this, it became necessary to find ways to produce more feed in seasons of the year when feed supplies were short so as to get better utilization of flush season growth. Originally, winter time was the short feed period, but this seems to be no longer so.

Winter feed is produced in several ways. The use of autumn-saved pasture is probably the simplest form. This is merely the closing of a pasture when the fall rains start and not using until sometime during the
middle of the winter or later. This gives plants a chance to make the maximum possible growth without interference from grazing or trampling limitations of leaf surface. Special purpose pastures such as turnips, chou moller, and some new grasses also provide alternative sources of feed. Hay, silage and grain are used also but require more labor. Grazing in place is most desirable.

**PASTURE PLANTS**

Most of the pastures I saw in New Zealand were perennial ryegrass and white clover. Huge amounts of phosphate fertilizer are flown on annually or are put on with ground equipment. At the time of my visit about a million tons of superphosphate were flown on annually. Clover and grass combinations were used, with the clovers being fertilized and the grass being supported by the nitrogen production of the clovers. Commercial nitrogen fertilizers were quite expensive and consequently very little was used on pastures. In combination with white clover, ryegrasses (perennial, short rotation, and annual) are used extensively in pastures. In addition, a lot of native annual grasses grow in the pastures.

Oregon growers too use white clover and orchardgrass or tall fescue for irrigated pasture. They work well together and do an excellent job. We have used subclover (non-irrigated) in Western Oregon with ryegrass, and this too makes an excellent combination, as it will stand intensive grazing and still make excellent production.

I was quite impressed with some research work with one of the tetraploid annual ryegrasses, a Westernwolths selection which had been developed by the plant breeding section of the Division of Scientific and Industrial Research in New Zealand which looks as if it has a tremendous potential for winter production. The fact that it is an annual may limit its use, but Kevin O'Connor at the DSIR Station at Lincoln indicated they were getting about 7,000 pounds per acre dry weight production as a winter grower. Some of these new varieties should be investigated for the potential for producing off-season feed in Oregon, as well as for producing feed during the regular season.

An improved Glutinosa variety of alfalfa developed at Lincoln College is making tremendous contributions to the grazing potential of the Canterbury Plain. The Canterbury Plain is an area of fairly shallow soils underlain with gravel. Alfalfa seemed to work well for total production and made better uses of subsoil moisture than most other plants. The alfalfa made up about 70 percent of the total pasture area where it was being used, with the remaining area in ryegrass, subclover, white clover and turnips. The alfalfa is fairly dormant in the winter and consequently is used as "run-off" pasture during the winter so the other pastures can be ration grazed. During the spring and summer months when the alfalfa is producing well, some is cut for hay and the rest of it is grazed rotationally.

A small farmlet of 30 acres on Ashley Dene, one of the college properties, was carrying five ewes per acre at the time that I was there. (This is under a 25 inch annual rainfall, a dry period in the summer time and a low rainfall period in the middle of the winter.) Since that time, correspondence indicates the farmlet is at 7 ewes per acre, with no reduction in lamb and wool weights per ewe. The use of lucerne or alfalfa probably has more than
doubled the potential carrying capacity of this kind of land over what it could do with white clover, subclover, and ryegrass.

Alfalfa might be used in Oregon as a combination with subterranean clover-ryegrass pastures to extend the production in the summer. It would give an opportunity to cut hay off part of the property and to increase the nutritive quality of the feed that we produce, particularly lamb feed, in the summer. Some of our bench soils could be put in alfalfa to increase the pounds of forage produced per acre, total feed per farm, and shift the distribution of production to advantage.

**SPECIAL PURPOSE CROPS**

The York Globe turnip is used as a special purpose feed for part of the winter in parts of New Zealand. It is planted in the late spring, makes some growth at that time through a fairly dry period in the summer and rapid growth with the early fall rains. A good crop of turnips will carry thirty to forty ewes per acre for a 90-day period during the winter. This is usually early in the winter and grazing would be completed by two weeks before lambing. This gives a chance to rest the pastures, so that by lambing time they have a pretty good growth of grass and can be used for lambing, reducing the amount of supplemental feed that must be hand fed to the ewes during the year. The yield of turnips varies from about 15 tons per acre up to a high of about 35 to 40 tons. The New Zealanders calculate that for every ton of turnips they can grow they can run one ewe for a 90-day period during the winter time.

We have tried turnips on our Demonstration Farm in Douglas County and they did exceptionally well, considering the situation. I feel that with further study as to planting dates, insect control, and management we can get excellent production from some of these and perhaps fit these into a sheep grazing program.

The turnips are all grazed in place and no special equipment is needed to harvest them. Generally, under the New Zealand system, they are ration grazed. In other words, the sheep are allowed into the field to graze for an hour and one-half to two hours a day once they get to eating the turnips. The New Zealanders calculate that this will give the sheep enough nutrients, along with the picking they get on the run-off pasture.

Chou Mollier or Marrow stemmed kale produces its useable feed above the ground. It also is used as a summer and fall grown winter feed. A good crop may grow 4 to 6 feet tall and produce great tonnage. Thicker stands may grow shorter and make better sheep feed. For every ton of green weight they can grow above ground, the New Zealander calculates he can carry one ewe for 90 days with proper ration grazing.

We tried some Chou Mollier on the Douglas County Demonstration Farm. While we did not get the yield that we would have liked, we did learn quite a bit about it. It did grow well, but appeared to need more nitrogen fertilizer. I think with trials to establish planting dates and methods we may have a good supplemental early winter grazing crop for some of our Douglas County pastures. This could help to extend our grazing season and cut down on the amount of supplemental feed needed in the winter time, in addition to helping us make better use of the pastures that we have. It also would be an excellent interim crop between plowing a pasture and
putting it back into improved pasture.

I think we have some real potential in Western Oregon for the use of tall fescues for winter pasture. The New Zealanders look on tall fescue as a weed but could make good use of improved varieties for short feeding periods. The new varieties that have been developed in the United States have possibilities for off-season feed. If these are properly managed, the sheep graze them well and they have the decided advantage of making more growth in the winter than ryegrasses, of making more total production on the better soils, and of holding green feed much later into the summer. Dr. Tom Bedell's work at Oregon State University would indicate that tall fescue, in combination with some legumes, may have tremendous production potential. It might have its limitations as far as a fat lamb feed is concerned, but it certainly makes excellent feed for ewes with lambs in the winter time when the other grasses are short. It also makes an excellent feed for summering ewes, or for that matter for carrying replacement ewe lambs during the summer.

**GRAZING PROGRAMS AND STOCKING RATES**

A visitor from this part of the world is impressed with the tremendously heavy stocking rates used in New Zealand. I saw many properties in New Zealand where the stocking rate ran from five to seven ewes per acre on land that was not too different from our grazing lands. Perhaps the rainfall pattern is more favorable in New Zealand, but it suggests that we could achieve much greater stocking in Oregon. A large part of the increased production potential would be achieved by efficiency of utilization of the feed that is produced.

The New Zealander may have a little more even production of grass during the various times of the year, but his attitude has been that when he had a short feed period, he figured out a way to keep it from being a short feed period and consequently developed turnips, Chou Mollier, and some pretty good winter grazing techniques. His grazing systems have been devoted to making the best use of grass. He stores some feed from flush times of the year to use in the poor times of the year. This may be as hay, silage, or autumn-saved pastures. (Refer to Page 14)

The New Zealander generally will "set stock" at a time when the grass is growing faster than the sheep are eating it. He puts the sheep on the pasture and leaves them there. When the sheep start eating more grass than is being produced, he rotationally grazes them or "mob stocks" the sheep (putting a large flock on one pasture and letting the rest of the pastures grow.) He makes the sheep clean up the feed before he moves them to another pasture. Rotating increases pasture production at high stocking rates, and improved utilization has resulted in greater carrying capacity. Up until daily production or growth is being completely utilized by the stock, there is little to be gained by rotation grazing. This leaves the New Zealander pretty much with a system whereby he set-stocks the sheep all through the spring until the lambs are weaned and ready to go, then he mob-stocks the ewes, forcing them to clean up some of the poorer pastures and some of the weeds they would not normally eat before he lets them on to new pastures. In this way he saves some feed for autumn until the grass gets off to a good start. He is able to have a good supply of grass available at lambing time; and consequently does not need to do as much
supplemental feeding.

We could use many of these techniques in Oregon pasture management. We have done some of this type of work in Douglas County and it has paid big dividends. Most winters are mild enough that we can let pastures grow from the fall rains on through winter and have pretty good growth for grazing by the time the lambs come in January. This can provide excellent feed about the time of lambing, and reduce the amount of supplemental or conserved feed needed.

The efficient way the New Zealander utilizes pasture is the most outstanding thing that I saw there. This is one practice, in my opinion, where most Douglas County sheep farmers fail in not efficiently utilizing the pasture they are able to grow.

To point out just how far one can go in utilizing of pasture, let me report two experiments I saw in New Zealand. There was reference earlier in this report of work at Ashley Dene. There was a small 30 acre farmlet with five ewes per acre. 70 percent of the land was planted in alfalfa and the other 30 percent in turnips, ryegrass, white clover, and subclover. Two years later they were running seven ewes per acre and according to the records they have not decreased the pounds of lamb produced per ewe nor the pounds of wool produced per ewe. This would indicate they have not yet reached the ultimate production on this land. This is in 25 inch rainfall country with quite a drought period in the summer time. Temperatures in this area would be very similar to Douglas County although cooler in summer. The major difference in climate would be a much drier winter than we have and consequently less mud problems. (Douglas County has many hill bench and valley lands that could be put in alfalfa if we were to do the proper job of liming and farming on them. Soil depth, fertility, lime and drainage are required but a number of areas have this possibility.)

While increasing the stock rate at a fast rate, New Zealand growers have run into some minor-element deficiency problems on the livestock. A copper deficiency has shown up in the lambs, requiring some fertilizing with copper sulfate to get the levels up to keep the sheep healthy.

We are in much more need of molybdenum in Douglas County area than we are of copper. Most of our forage analysis so far have been high in copper and low in molybdenum. However, as we get further into this type of a program, difficulties may arise and will have to be taken care of. Research could help to lay the ground work for this type of grazing here.

The other stocking rate trial observed was at Ruakura, under the direction of Dr. A. G. Campbell. Here the soil type was uniform and the pastures were laid out so that each pasture was nearly as comparable as they could get them. This area gets about 70 inches of annual rainfall, reasonably well distributed over the year, a fairly mild winter, and summer temperatures that didn't go above 70 to 80 degrees normally. They divided the area into small pastures and set-stocked them with a given number of sheep. The lowest stocking rate on the pasture was 3 1/2 dry sheep per acre. Other trial rates were 7, 8.9, 10.7, 12.5, 14, 17, and 21 sheep per acre. These were all dry sheep and the only measurements taken were body weight of the sheep and the weight of wool produced per sheep. Between the 8.9 and 10.7 sheep per acre rates there was a dramatic change in the pasture. At 8.9 and below there was dead grass left on the pasture each year. At the 10.7
sheep per acre and above there was no visible dead grass left on the pasture during the year. This seemed to create quite a dramatic change in the sheep. At 8.9 sheep and below, the sheep had lost weight on the pasture over an 18 month test period. In comparison the sheep gained weight at stocking rates of 10.7 sheep per acre and up, until they got to about 14 sheep per acre. The New Zealanders felt this was due to the amount of dry residue being left on the pasture interfering with the growth of the new pasture and also the consumption of that new growth. They felt that sheep were not able to select a high quality diet to make them gain. When the sheep ate all the feed, despite the fact they didn't have all the feed that they wanted to eat, the diet was high enough in quality that the sheep continued to gain until they got up to 14 sheep per acre. The wool production per sheep stayed about the same until they got to 14 sheep per acre and then it started dropping off. By the time stocking tests reached 21 sheep per acre they had increased the total wool production per acre by only 10 pounds, while shearing six or seven more sheep.

To me this shows that we have much to learn about how efficiently sheep can utilize pasture. Until we really start pushing our sheep to see what they will do under more intensive grazing conditions, we really don't know what kind of returns we can expect. In the New Zealand trials the sheep did not need a fully adequate diet of all they wanted to eat to do a good job. However, the feed did have to be of good quality to keep them doing the kind of job desired. Perhaps in many cases Oregon growers are seriously limiting production by not utilizing the pasture growth that is being produced.

THE NITROGEN CYCLE

The nitrogen cycle has been pretty well worked out by the New Zealanders and other scientists in the world in regard to the influence that livestock have on pasture and the pastures have on livestock. A diagram of the nitrogen cycle shows the pasture producing clover and grasses. The livestock eat the clovers and grasses. They carry off some of the nitrogen in the form of protein in meat and wool but most of it is returned to the soil as dung and urine with the major part in the urine. This is carried into the soil by rainfall, where bacteria attack the urine and the dung and break these down into nitrate, which goes to stimulate production of grasses. The clovers at the same time are taking nitrogen from the soil air through the root nodules. This "fixed" nitrogen provides for growth of the clover. Some nitrogen is put back into the soil through decomposition of the dying roots. There is also a limited transference of nitrogen from the clovers directly to the grasses.

The more livestock you run on the pasture the better it will grow because of the terrific amount of nitrogen that is put back on the pasture, by additional animals, another reason to use all possible available pasture. New Zealand research tells us that the urine patch concentration is equal to about 100 pounds of actual nitrogen per acre. The urine patch from a dairy cow receive somewhere between 200 and 400 pounds of actual nitrogen per acre depending on how she is being fed. If you can completely cover the area of a pasture with dung and urine patches from sheep or cattle, this would tremendously increase the production from that given pasture. The New Zealanders calculate that to really get the nitrogen cycle working under their conditions requires about five sheep per acre.
I visited individual farms where the ranchers would explain this to college classes that were visiting the farm. They would indicate real difficulty in increasing the carrying capacity until they got up to about five sheep to the acre. When they reach this point they seemed to be able to add a half sheep per acre per year and still have adequate grass to take care of all the sheep they had on the pasture. Most growers visited had not yet reached the level where they felt they could not add the additional sheep. Some farms I visited were in the neighborhood of seven sheep to the acre. Douglas County average is about 1 sheep per acre on improved pasture.

Part of it also may be a difference in attitude of a New Zealand farmer and how he looks at the situation. When you arrive at a change in attitude to where you think you can do some of these things you find it much easier to do them than if you are skeptical about whether they can be done or not. There is a tremendous potential if we can achieve this change in attitude on the part of our sheep farmers.

**FERTILIZATION**

Fertilizer programs in New Zealand and Douglas County do not differ greatly. In general, New Zealand growers use more fertilizer on establishment than we do, but use less as a maintenance application. This probably is due somewhat to the higher level of stocking they use, which helps cut down on the amount of fertilizer needed, through livestock returning more fertility to the pasture.

In Western Oregon, I think we will need to maintain fairly high levels of phosphorus applications until the level in our soils becomes built up to the point that we no longer get the big responses that we do at the present time. As we achieve higher and higher rates of production and more and more livestock on each acre, perhaps we can cut down on the amount of fertilizer that we use annually.

In regard to fertilization at establishment, the New Zealanders currently are recommending higher rates. This varies in some instances from 400 to 1,200 pounds of single super phosphate per acre during the first eighteen months that the pasture is established. The New Zealanders feel that this gets the plants off to a good start and achieves much greater production over the first few years. I think this may have some application in Douglas County, especially to correct the low phosphate levels that we have. This might also cut down on the maintenance fertilizer that we would apply in the years following the establishment. More research needs to be done on this.

Most of the fertilizer is applied by air in New Zealand. Something like nine hundred thousand tons were applied by air in 1966, 1967. Some is put on with ground equipment, but by far the majority is put on by air.

Application of fertilizers other than phosphorous and sulfur is rather limited in New Zealand. Quite a bit of molybdenum is being used in some areas and limited amounts of potash and nitrogen. Nitrogen is an expensive fertilizer compared to phosphorus and consequently is used only as a special purpose fertilizer under certain conditions. Interest in potash seems to be growing as more and more soils become slightly deficient in potash. Minor
fertilizer nutrients such as copper, cobalt and zinc are used in some areas as better research information becomes available on needs.

It would appear that we probably should use more fertilizer on both the nitrogen and potash types in Douglas County. The relationship of the product that we sell to the cost of fertilizer is much more favorable for us than it is in New Zealand, and perhaps there are possibilities of getting good responses to the use of these fertilizers. Special care needs to be taken in the use of nitrogen fertilizer. More observation and research should provide the knowledge of when and where we should use nitrogen fertilizer to the best advantage. It may have some real possibilities in Oregon on annual ryegrass planted in the fall for winter green feed for sheep or grass pastures such as tall fescue. Certain strains are able to grow at lower temperatures than others and adapted varieties can partially overcome the temperature that appears to be limiting on growth.

**PASTURE ESTABLISHMENT**

Besides the use of fertilizer on establishment of improved pastures, there is a marked difference in the rate of seeding used in New Zealand. Generally the New Zealanders use a considerably higher rate of seed than we do. For seeding white clover, they use about the same rate that we do, two to three pounds. But ryegrass or other grass usually is seeded in much heavier amounts than we normally would recommend. In many cases a bushel (22 pounds) of ryegrass per acre would be used as part of a seeding mixture. We use six to eight pounds. This is linked to the amount of fertilizer they apply, but also is linked with the stocking policy following seeding. A high stocking rate on the new seeding as it comes up and begins to produce helps keep the ryegrass from crowding out the legumes that are introduced into the pasture.

If stocking rates in Oregon begin to approach New Zealand rates there could be benefits to increasing the seeding rate for much faster pasture establishment. I think this could result in full production of the pasture in a much shorter period of time, provided there is available the necessary stock numbers and management to utilize the feed and keep the grasses short enough that the legumes will be maintained in the stand. High stocking rates on new pastures are generally beneficial if the feed is used properly and this should hold true here as well as in New Zealand. With adequate seeding rates, adequate fertilizer and adequate grazing, new sod can be established much more rapidly than we now do. The general tendency here is to seed the pastures at a lighter rate, let them grow taller, and not graze them off as close. Under these circumstances higher seeding rates, particularly of grasses, could result in losses of the legumes that are so important to the stand. The additional stock also would contribute a greater fertility to the pasture and consequently more growth.

Seed bed preparation is similar in Oregon and New Zealand. The evener rainfall pattern in New Zealand has a great beneficial effect on establishing the pastures. Fall rains and accompanying cold weather here are somewhat more detrimental to a new seeding than are the milder temperatures and the more general rainfall in New Zealand.
INOCULATION

Inoculation and nodulation apparently are problems in New Zealand, just as here, although probably less so because of the species and the fact that work has been done more consistently over a greater period of years. Inoculation is necessary on legume seedings. Care needs to be taken on methods of inoculating and strain of bacteria. On new soils good inoculation is a must. Researchers are working with inoculation, but many of the major problems still need to be solved.

Considerable work has been done with lime pelleting in both Australia and New Zealand. The Australians feel that lime pelleting has been beneficial to establishment of legumes on acid soil; however, most of the people that I visited with in New Zealand did not feel that lime pelleting was beneficial. Its greatest possibilities would be on acid soils below 5.0 pH. New Zealand research workers felt that lime pelleting did not aid nodulation, with the possible exception of alfalfa where small amounts of lime appeared to have a beneficial effect. Molybdenum will take care of the situation on many of the soils provided they are not too terribly acid. Considerable research was being done at the time that I was there. From studies observed in New Zealand, here, and from my observations, I question that lime pelleting will have much beneficial effect for Douglas County. Use of lime in close proximity to the seed may have more effect in interfering with phosphorous utilization by the plant than the beneficial effects which it could have on nodulation. OSU studies are not all in agreement and more work needs to be done to clarify differences in results.

The New Zealanders and Australians both have worked with coating seeds, particularly if they are to be air sown, to protect the inoculation. There is beneficial theory behind this and we hope more research work along this line will prove this to be beneficial in preserving live bacteria on the seed until it is on or in the ground.

RECOMMENDATIONS OF RESEARCH NEEDS

In summary, Oregon sheep producers may benefit from New Zealand know how. Research can show which ideas are applicable here. These are some areas I feel need study to help develop the sheep industry in Douglas County and the State of Oregon.

Foot Rot

While foot rot is a problem in New Zealand, it does not appear to be anywhere near the problem that it is in Douglas County and most of Western Oregon. Perhaps one major reason for this has been selection by New Zealand sheep farmers for sheep that are not as susceptible to foot rot as some of the breeds that we run. Foot rot does not appear to be nearly as much of a problem in Romney sheep, and while part of the resistance to foot rot probably is natural from the place where the Romney originated, effort has also been put into selection by the New Zealanders saving only sheep with pure black feet. Any Romney sheep with a white foot is automatically culled from the purebred flocks. The New Zealanders feel that this has helped in resistance to foot rot susceptibility. Tighter grazing control of the pasture also probably eliminates some of the difficulty from foot rot and foot scald. Problems of foot rot are not nearly as great in a short pasture as they are in tall overgrown pastures which partly may be
due to the irritation of the foot as it is dragged through taller grass. More moisture in the pasture means conditions more favorable to the foot rot organism. Foot rot vaccines are finding their way into the market in New Zealand and Australia with at least some results in cutting down the severity of the disease. Some work is going on at Oregon State University at the present time in working towards a foot rot vaccine. If this is successfully completed, it could be a big lift to the sheep industry in the State of Oregon.

**Predator Control**

In New Zealand they have almost no natural predators on sheep. Only one native bird in New Zealand is a predator on sheep, and that is the Kea, a small mountain parrot which occasionally will kill sheep in the high country. Wild pigs introduced into New Zealand many, many years ago are a slight problem in some areas as a predator on sheep. Probably the biggest problem is neighbors dogs, and this is not really very much of a problem in most areas. On the other hand, predators in Oregon are a major problem in maintaining the sheep population. Research work on control methods and fencing hopefully can provide a better solution that we have at the present to this major problem we have in the Oregon sheep industry.

**Stocking Rate Demonstrations**

Of great importance to the sheep industry is working out techniques to increase carrying capacity of our pastures. For this we need demonstrations and trials to determine how our sheep will react under high-stocking rates. Certainly there is a good background of information on stocking rates from Australia and New Zealand, along with many other management techniques and their influence on income. More of this work needs to be carried out here to try to determine what actually are the factors that are holding us back from heavier stocking of both sheep and cattle.

**Flushing**

We need additional study on flushing and multiple births. It appears we have very limited good information now about exactly what benefits are received from flushing and how we should flush sheep to get the most multiple births. We see much difference between individual flocks, regardless of whether they are selected for the trait or not. Individual management of the flocks influences lambing percentage, both from the standpoint of number dropped and number saved. Some research to come up with some better answers would be helpful.

**Seasonal Feed Production**

To promote heavier stocking, some work needs to be done to provide more feed during the "off seasons". We need better answers than we have at the present time. Turnips and other specialty crops may have a place, but there probably are other answers that we haven't even thought about at the present time. We need to know more about special purpose pastures such as turnips, Chou Mollier, alfalfa, rape, sudan and other crops of this type.
Job Contractors

Some investigation should be made into the possibilities of contracting work of certain types on the farm. As flocks get larger we need to cut down on the amount of work that the individual farmer has to do to take care of other jobs so that he has more time to devote to the sheep. The possibility of contract fencing along with contract shearing, contract fertilizing, and other jobs of this type should be investigated. To me this not only extends the possibility of lowering the cost, but also of increasing the labor efficiency greatly.

Animal Health

The problems in animal health, particularly sheep health, need more investigation. Larger concentrations of animals in any given area means better informed veterinarians who are able to do a better job of preventing disease and curing it when it happens. Ultimately in my opinion, the answer is in prevention, not in cure. More research on diseases, such as pneumonia, would be beneficial to the sheep industry. Perhaps techniques used in other countries could be applied here if we can get clearance through the Pure Food and Drug Administration. Perhaps a striking example would be the possibilities in regard to White Muscle Disease prevention. In the United States the only legal method of doing this is by the feeding of feeds purchased from areas that are high in selenium, or a supplemental shot to the ewe, or to the lambs shortly after birth. These are all expensive. The purchase of feed shipped from high-selenium areas, of course, costs a lot more, than the same type of feed purchased locally. The shot, which is a good preventative for WMD, is so expensive at the present time that it would be almost impractical as far as the ewe flock is concerned. If the material could be given to the ewe ahead of lambing it could prevent all difficulty with WMD in the first two to three months of the lamb's life and, in many cases, would eliminate any further need for treatment of the lamb. The cost of treating the ewe on the regular commercial market today in Douglas County is about $60 a head. This can be cut to about $15 a lamb if the lamb is given a shot at the time he is born; however, with a disease like WMD we have some losses of lambs that are weak or dead at birth. Contrast this to the use of selenium as sodium selenite given in a drench to the ewes ahead of time (at a cost of less than $1 per sheep) used in New Zealand and Australia. This could make a tremendous difference in the cost of health care on some ranches. These and other diseases would bear more scrutiny.

Sometimes our problem is getting a good diagnosis. Too many times ranchers do not take dead lambs and ewes in to get autopsies and find out what the real problem is. It looks as if it would be possible to do a better job of combining vaccines to cut down on the number of shots given per ewe. This, again, would be labor saving as far as we are concerned. It appears to me that there are some real possibilities in the sheep health field.

These are a few of the major problems that I see facing the sheep industry on which we need some answers as soon as possible. Research could clear up some problems in the sheep industry quite rapidly and help to stimulate and make a more viable industry.