



**AUSTRALIAN NUFFIELD FARMING SCHOLARS
ASSOCIATION**

**REPORT OF VISIT TO THE
UNITED KINGDOM**

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(Queensland 1983 Award)

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It was not long after I arrived at the Farmers Club in London, met up with the other scholars and Captain John Stewart, that I realized this was going to be a unique experience in my life. It has infact made an indelible impact on my life.

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Cont...

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INTRODUCTION

Throughout my scholarship there were many language problems, as well as humorous discussions.

One of the more amusing discussions was with the local vicar who was paying a visit to "Sourhope", a hill farming research station in the Cheviot hills of Scotland.

While having an evening drink with the Armstrong family, and discussing financial problems in general, the vicar said "Even the banks here in Scotland are now making the church draw up a yearly budget, and talk cash flow",

I was continually confused by the dialect and accent in Yorkshire and Scotland. To my amazement, the large trees one Yorkshire man referred to as "The Hawk trees" turned out to be Oak trees.

I also took some time to relate to the following terms used by sheepmen in Scotland:

Hoggs	-	ewes or wethers	6 - 12 months
Tups	-	rams	
Gimmers	-	ewes	
Cut	-	flock of sheep	
Hefts	-	hill	
Burns	-	stream	

And finally a quote from Captain Stewart:

"An apple without cheese is like a kiss without a squeeze." An apple has never been the same since.

W O O L

1. THE INTERNATIONAL WOOL SECRETARIAT

2. DESIRABLE CHARACTERISTICS

3. CONCLUSION

WOOL

1. THE INTERNATIONAL WOOL SECRETARIAT

My study of the wool industry started at the International Wool Secretariat head officer in London. My introduction had been arranged by the Australian Wool Corporation in Melbourne.

Subsequent visits were made to the IWS Technical Centre at Ilkley in England, to IWS branch offices at Dusseldorf, Milan, and Paris as well as my visit to the knitting workshop at Delft in Holland, and the International Wool Fashion Office also in Paris. All emanated from the initial London head office visit.

At all IWS branches I found the same strong belief in the future for wool. The branches are staffed by many specialists in the wool textile, retailing and promotional fields, all of whom are multi-lingual (a distinct advantage to me) and are vitally interested in the work they are doing with IWS.

Achievements

The now well known wool mark symbol was created by IWS and is currently used by more than 14,000 companies, and is recognised by more than 400 million people throughout the world. The symbol gives the consumer a guarantee that the article is made of pure new wool, and that it will conform to the many strict standards laid down by IWS. This is a very valuable guarantee, to assure consumers that the product they are buying is of high quality.

Superwash

The development of machine washable wool by using a coating of resin on wool fibres, allows wool to be washed in a washing machine without the fear of shrinkage. The resin actually fills in the small hooks or scales on the wool fibres. Without this process wool fibres during a washing process rub against each other, the hooks gradually working their way along another fibre, eventually shortening the length, which will cause shrinkage.

Zirpro

Wool is naturally more flame resistant than other fibres, and through a simple inexpensive treatment this property can be greatly increased. During a hot metal spill test, wool's performance was superior to that of other fibres including asbestos. The material properties of wool won't support hot burning metals, whereas cotton will burn, synthetics melt, and asbestos holds the metal and so will burn the skin. The dangerous and poisonous gases of synthetic fibres in a fire, have led many airlines to order Zirpro wool for their thin furnishings in recent years.

Market Research and Promotion

Promotion is the largest single item in the budget of ISW, and includes TV, radio, and magazine advertising. Each of the branches I visited has tailored a promotion programme to suit that country's particular requirement, as each country has very different consumer demands.

During the last five years, wool consumption has remained static, and market research shows that wool is regarded as a seasonal fibre. This has led IWS to promote wool more as a year round fabric, and the "COOL WOOL" promotion campaign has been launched. In the area of knitwear, European consumers now prefer wool and many of the developments from the knitting workshop in Delft are in the use of lighter weight knitted fabrics. The work at Delft has meant that wool is the No.1 fibre in knitwear whereas in 1970 wool was No.2. Pure new wool now represents 29% of the knitting market, and is a clear leader in industry. Knitting wools will play an increasing role in the expanding leisure wear market.

FUTURE DEMAND

When starting to evaluate the future demand for wool, we have to look at lifestyles of the population in consuming countries. Today's society is gaining more leisure time, and the European leaders of the fashion industry are planning new trends in an endeavour to make certain of capturing the lion's share of the clothing market the modern lifestyle will demand. They are basing their plans on predictions that by 1990, up to 35% of the European community's time will be spent at leisure.

Today's children will be the consumers of 1990, and the environment that they are living in today, computers, space age, awareness of physical fitness will be reflected in what they will wear. The trend today is a move away from "classics" to separates and to light weight clothes.

WOOL MARK

I believe there is an urgent need to evaluate the wool mark symbol. Its effectiveness has been lessened by its association with pure wool of any quality, including even coarse quality, lower-grade wools with many undesirable faults.

The consumer still sees wool as representing a high quality, value-added product, and continued use of the symbol on products at the bottom end of the market, will erode the faith of the consumer in the qualities of wool. Leading fashion designers are tending to sell their top quality woollen garments by their personal brand names rather than as pure new wool. This must be investigated.

Marks and Spencer, one of Britain's largest retail clothing markets, obtain assistance from the British Wool Board for promotion of British wool. They sell 20 million pounds of British woollen garments annually, and 150 million pounds of woollen garments of fine quality which is clear evidence of the consumer's preference for the better product. Their wool sales have increased 30% in the last year, and sales of synthetics only 15%. People are asking for wool. British wool is not a high-quality product, as it has many damp and dark fibres, but it makes up into an easily-saleable, cheaper quality garment.

If the symbol is to continue, it could well be promoted in sporting arenas from where media coverage goes world-wide. IWS on their present limited budget, would be very reluctant to take the monetary risk such advertising would involve, but I believe that the young consumer must be made aware of wool, and this would be one way of catching the eyes of those people.

Conclusion

It is quite clear that the role of IWS is vital to the survival of the wool industry. Through technical developments wool is no longer compared with other fibres for performance, but rather other fibres have to face comparison with wool.

In the fashion market wool is regarded as a fashion leader, and other fibre manufacturers look to see what wool is doing.

Many Australian woolgrowers begrudge the money they contribute to IWS because they are told very little of the work IWS does world-wide. This resentment must be overcome. Better liaison between IWS and the grower is essential, as there is no doubt in my mind that IWS is vital to the survival of the Australian wool industry. Their service to the consumer of our wool-clip is invaluable.

2. DESIRABLE CHARACTERISTICS

Fibre Length

Fibre length and strength will be just one of the additional measurements for the sale of wool in the future. I am sure that we all regard the optimum length of our wool as important criteria in breed selection and evaluation.

However one of the most important points in fibre length is what happens during the processing of wool. The process of combing wool has evolved around an average length of staple of $3\frac{1}{2}$ " to 4" (a warp) and during this time the combs have been improved so as to allow the maximum throughput of wool without breaking the length of fibre.

Any increase in the length of the staple will have to be combined with an increase in the tensile strength to avoid longer wools producing an un-acceptable variation in length. I really see very little reason to increase staple length because the seasonal and lambing stresses already have an effect on tensile strength, of the staple. Fibre length and tensile strength are measured after the first stage of processing into wool tops, and premiums are paid for wools with a good tensile strength.

This will increase the speed at which the spinning machines will run and so reduce the cost of spinning, and the eventual cost factor in manufacturing wool. It is only a matter of time before staple length and tensile strength are measured prior to sale, and premiums will be paid for the better performance wools.

Colour

The colour, or degree of whiteness in merino wool is another important measurement. As with staple length and tensile strength, colour is measured after the first stage processing.

Whiteness is important as it affects eventual colour of the garments, and colours today are tending to be lighter.

Early Australian Merinos had a 50% clean scoured yield compared with a 70% yield today, which is most desirable.

The problem the industry is experiencing is because of strict pollution control which makes it harder to produce a white wool top. This means we must try to protect the wool on the sheep's back with sufficient grease to lessen the effects of the weather on the raw product.

Wool tops are sold by the degree of whiteness and premiums are paid for the whitest wools as these can be used in virtually any end-product.

South African wools are considered superior to ours in whiteness, and they carry more grease.

Following my visit to Prouvost and Lefebvre, the largest wool combers in Europe, and conversations I had there with George Maes and Bernard Florin, I consider we must monitor wool grease more closely, as it is wool grease that protects wool from the elements, such as dust, rain and stains from vegetation. It will be the wools which wash to a high degree of whiteness that attract a premium once we have pre-sale testing for whiteness.

Crimp

Crimp is what gives wool its ability to return to shape after washing or dry cleaning, and is essential in the spinning process. Without crimp, wool would break much more often during spinning, as crimp allows a shock absorber action.

At the IWS knitting workshop in Delft, I was assured by John Heeringa that the crimp in Merino wool, particularly in the 20-22 micron range, is important for the better handle and retention of shape of a finished fabric.

Synthetic fibres now being produced have a crimp in their staple length, which corresponds to the micron diameter of the wool fibre.

Crimp helps especially in the lighter weight knit fabrics with must have retention of shape.

29% of the knitting market in Europe now belongs to wool. In 1970, wool was only second fibre on the knitting market, so the change in preference to wool fibres from synthetics is good to see.

Clip Preparation

Everywhere I went, the same complaints were levelled at me as an Australian woolgrower. Many of the representatives of the European wool industry which whom I met and had discussions were pleased to have first-hand contact with a stud sheep breeder rather than with business and technical representatives of the Australian wool industry.

For the Italian market, clip preparation is of paramount importance, for much of the wool consumed is in the 19 to 21 micron range, and is in the specialty fabric or fashion area.

Combining too many micron counts and lengths only eliminates the Italians from the auction market. The biggest market in Italy is in the 19.5 to 22.5 micron range. Cerutti last used 29 micron wool back in 1976. Their manager in Biella told me they only buy Australian wool - non from South Africa.

Eugenio Scola, Italy's largest wool merchant, who knows Australia well, was adamant that great harm has been done to the reputation of Australian wool by the contamination caused by the use of polypropylene wool packs. He has clients who are prepared to pay extra for wool packed exclusively in nylon packs. His best client has offered to buy nylon packs to give to the growers, so great are the problems of polypropylene contamination.

Dark Fibres A Problem

According to Helmut Schumacher, in Dusseldorf, dark fibres are creating immense problems for weavers.

Wool tops are sold with a dark fibre count, and some 19.5 to 22 micron wools still test out showing between 2 and 5 dark fibres per 100 grammes.

These dark fibres limit the colours wool can be dyed.

There is scientific evidence suggesting that many of these dark fibres are, in fact, urine stains, which could be eliminated by better skirting in the shearing shed.

Better preparation of the woolclip would help overcome this major problem being faced by our traditional customers.

3. CONCLUSION

Fibre

Any great selection for an increase in the fibre length will not lead to an improvement in performance. Selection must be for fibre density rather than an increase in fibre length when looking to increase wool production from merino sheep.

Colour

There is a need for more research on the wool colour, and whether it is affected by nutrition, or is a genetic trait. Australian wool growers must be more conscious of wool grease and the way it protects the wool fibre. More selection must be done based on a greasy/clean fleece weight, and not on clean fleece weight alone.

Clip Preparation

Much greater care is needed in the preparation of the Australian wool clip at the shed level. We are only limiting our market competition by poor skirting which causes the major problems.

Australian Merino wool is regarded as the best in the world, and is asked for by name. A large market for merino wool is in the fashion market, and Europe with 250 million people, living in an industrialized community is a very important part of that market. Australia's merino wool market is in the Northern Hemisphere, where consumers regard wool as being an added value fashion fibre. The promotion for wool as a year-round fabric using simple marketing slogans as "Lana Fredda" cool wool, "Casual Elegante", will mean that merino wool will be worn in the warmer climates of the world as a summer fabric as well as for warmth.

Australian wool growers need to recognise that consumer demand has to be met and they must continue to improve the performance of merino wool.

I believe that the future will be for merino wool below 23 microns. It is this type of wool that made Australian Merino Wool famous.

1. SHEEP PRODUCTION

2. PERFORMANCE RECORDING

3. FLOCK MANAGEMENT

1. SHEEP PRODUCTION

INTRODUCTION

My research into lamb meat production began with meeting English representatives of the British Meat and Livestock Corporation, followed by research with HFRO and ABRO in Scotland.

I was also lucky enough to be invited to attend a course in Edinburgh by the British Council in May in Management and Disease in Sheep.

At the Rowett Research Institute in Aberdeen, I saw invaluable work being carried out on the relationship between cannon bone size and meat production in sheep.

From these rather intensive studies, I was made very much aware of the major problems confronting sheep meat producers today.

Consumer Problems

The consumer today says lamb is too fat, has too many bones and is difficult to carve.

I can't disagree with these complaints - I only have to look at my own children's plates when they have "finished" a meal of lamb.

The fat cover of lamb so undersirable to the consumer is further complicated by lamb marketing practices.

I believe the problem in Australia begins with the producers. They so often hold lambs which are ready for sale, hoping for a better market.

The butcher doesn't help either - the meat is marketed under names with uninspiring sounds - fat lamb, prime lambe. These terms will not attract the custom of today's health-food-conscious consumer.

Consumer Requirements

Today's consumer is not always a housewife. Our modern lifestyle has changed the old pattern. The potential lamb meat buyer might well be a bachelor, a working wife or a single parent who will demand convenience food.

We must therefore look closely at the present archaic marketing arrangements in Australia. The British, with their BUY BRITISH theme, have developed some good innovative marketing ideas which we could do well to follow.

The consumer demands meat with eye appeal, in convenient packaging, and it must be available in the supermarket. The word 'meat' has become synonymous with beef rather than lamb.

New cuts have been developed which satisfy these requirements in part. Under British flags, well-labelled British lamb, I saw boned carcasses, lamb steaks, Valentine loin steaks and supermarket-pack roasts.

The consumer wants to buy only lean meat, ideally from a carcass with a fat score 3.

Strong evidence of this consumer preference is the variable premium paid by the EEC for fat score 2 and 3 lambs whereas a fat score of 4 incurs a penalty and lambs of fat score 5 are ineligible for price support by the EEC.

Sire Selection

Tests I saw in Scotland involved the tagging of lambs to identify their terminal sires. Lambs were processed through the slaughter house and the yield of lean meat recorded.

Yields ranged from 58% to 75%.

It is clearly possible to select superior sires by their progenies' tested performance. Computers make this process simple.

Reduction of fat cover remains a major problem - internal fat is creating the biggest problem in breeding selection. Whilst external fat can be removed by trimming, internal fat is there to stay.

Ultimately, the lamb of the future will be much heavier - a dressed weight of say 25kg as opposed to today's 17kg.

Producers must have animals which perform. Only by performance recording can the breeding be perfected so that the optimum yields of saleable lean meat are achieved.

The percentage of fat on a carcass classification 3 is 18.5%, as against 25% for classification 4, and 29% for classification 5. This represents an unsaleable product - FAT. The variable premium payments of the EEC are worth selecting and breeding for.

The Commercial Angle

In certain regions of Britain, producers are grouping together to form co-operatives to process and market their lambs.

Contracts with Waitrose Supermarket Chain require lambs which dress at a minimum of 22kg of lean carcass. This meat is all steak, boned-out lamb. Demand is so heavy that producers have been unable to supply the requirements needed to satisfy consumer demand. *

Cannon Bone Length

Research into the significance of cannon bone length has been based on a selective breeding programme involving a short C-B group, a long C-B group and a control group, all from the one flock, the aim being to study the relationship between conformation, growth and carcass quality of the lambs.

(4)

By 1979, after 25 years of breeding within this closed flock, striking difference emerged, showing the flock with long C-B length to be far superior in prolificacy and carcass composition.

Average C-B length differed by 25% and the sheep showed obvious differences in conformation.

The ewes with long C-B were producing an extra 8% of lambs born compared with the short C-B ewes.

These flocks were run on hill farms.

Under improved grazing conditions, the long C-B ewes produced 20% more lambs than the control group.

The short C-B lambs were shown to be fatter at the same live weight or same carcass weight.

The heritability of this trait is 50%. Lamb-meat producers can easily select sires for this trait. The greater prolificacy and appreciably higher yield of lean meat shown by selecting sires for long cannon bone is very significant.

Conclusion

The Australian lamb-meat producer faces a falling consumption because the modern consumer demands a different type of product from the one currently offered.

Until the producers recognise this fact, lamb consumption will, I believe, keep falling.

Future selection of sires holds the key.

Today's lambs carry for too much fat and are too small.

Europe has shown us the way. We can only benefit from the research already carried out to produce tomorrow's lamb.

Europeans haven't eaten fat for years. Health conscious people throughout the world are now avoiding fat. Our producers in Australia must realise this and develop their product and marketing methods to suit consumer demands.

2. PERFORMANCE RECORDING AND FLOCK MANAGEMENT

Identification

With any recording scheme, positive identification is essential.

While I was with Robin Armstrong at the Hill Farming Research Station, "Sourhope", I looked at the research done by them with their sheep flock.

After much work with a variety of sheep tags, the soft Ritchie tags have proved to be superior. They seldom, if at all, tear out of the ear, so often the case with other tags. The softness of the tags appears to be the reason they do not tear out when caught in a fence or hay rack.

At lamb marking, all lambs are tagged as well as being tattooed as a second mark.

Prior to lambing, ewes are identified using a removable and reusable collar. New-born lambs are tagged with turkey tags which are also reusable.

Flock Recording

From Robin Armstrong's experience it is essential to define the most desirable characteristics for improvement.

His research at "Sourhope", has led him to conclude that it is unwise to close the genetic pool, and wise always to choose sires from a similar environment, and when making comparisons, to be careful not to confuse nutrition with genetic improvement.

"Sourhope", runs a pure Cheviot flock, which has many advantages over a cross bred flock in lamb production.

Because the flock is self-replacing, greater emphasis is placed on the development of a lamb carcass more suited to the requirements of the consumer.

Production of the flock is recorded on a per acre basis rather than per head.

Since the programme was introduced 12 years ago, breeding ewes have increased 63% over the original numbers, and individual animals performance from 20.5 to 30.9kg of lambs weaned per ewe mated.

Wool production has increased by 122% over the same period. The gross margin per ewe, based on 79/80 costs and prices, has increased from 11.50 pounds, (approx. \$23) to 18.90 pounds, (approx. \$38) in the same period. (See Table 6).

Increasing Production

Part of this progressive increase in production has been achieved through improving nutrition on a year-round basis.

Increased output of lambs weaned per ewe mated requires improved nutrition at three critical periods: firstly at mating time, which will increase the conception of twins; and then at late stages of pregnancy and thirdly in lactation to insure that these additional lambs are properly nourished both before and after birth.

Body condition is important at mating time, as lambing percentage will increase with an increase in body condition at mating, and an increasing body weight during this period will produce more lambs than ewes in similar condition which are losing weight. The ideal mating body condition is score 2 - 3.

Individual Recording

In a pedigree stud, flock recording of individual animals has many advantages particularly when a single genetic trait is being evaluated.

During my study at the East of Scotland College of Agriculture, I spoke with May Lloyd, and Bill Dingwall, Specialist Sheep Advisers, on recording of individual sheep.

Ewe Index

For growth and wool follicle developments, lambs have to be weighed and tagged at birth.

May Lloyd says that lambs have to be weighed again at 56 days, taking the mean birth date of lambs as the birth date.

Using this information, ewes can be indexed on milking ability and selection then taken on the top 30% as the best performers. Bill Dingwall says never index ewes on their first lamb.

Ram Index

To select for weight gain in terminal sires, lambs must be weighed at 20 weeks. If a later maturing lamb is required then a 24 week weight would be used.

The top performers would have to be 30% above the mean for maximum genetic improvement.

Carcass Yield Selection

In Scotland at the Buchan Meat Producers Co-operative slaughterhouse, local producers are evaluating the terminal sires used by the recording of saleable meat produced on lamb carcasses.

All lambs in this scheme are tagged, identifying the lamb's terminal sire.

The yield of saleable meat varies from 58% to 75%, clearly demonstrating superior performance by some lambs.

Conclusion

More research needs to be done with pure bred flocks in an endeavour to develop a larger, leaner lamb.

Greater genetic progress is achieved with a pure bred flock as they are much more suited to their environment than sheep bred under different conditions.

Performance recording of a flock on a per acre basis, rather than production from individual animals will result in greater profitability.

Performance recording is a valuable aid to livestock production. However, when considering a scheme, care must be taken to ensure that the criteria being evaluated have a commercial value.

Table 6: Gross margins (£)

a) Prevailing costs and prices

	Base data												
	5 yr. av.	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Ewe numbers	387	398	451	518	528	573	600	601	620	621	623	622	631
Income													
Lambs	1387	1235	1329	2197	3071	4287	3576	4495	7668	9398	9691	10060	11545
Wool	430	421	470	670	720	852	801	1012	1223	1653	1698	1846	1957
Cast ewes	326	229	176	533	391	1170	744	963	1661	2359	2300	1887	2187
Gimmers (surplus)									586				
Subsidy	476	490	555	829	871	946	1800	2163	2232	2236	2243	2550	3470
TOTAL	2619	2375	2530	4229	5053	7255	6921	8633	13370	15646	15932	16343	13159
Expenditure													
Feed	195	498	787	490	722	893	1492	1477	2297	4616	3638	5523	4866
Grazing	—	33	33	92	121	119	—	—	—	—	—	—	—
Fertilizer	—	—	—	—	—	—	22	50	48	140	97	227	506
Other costs	301	398	460	508	491	636	798	968	1178	1310	1788	2034	1880
TOTAL	496	929	1280	1090	1334	1648	2312	2495	3523	6066	5523	7784	7252
FLOCK GROSS MARGIN	2123	1446	1250	3139	3719	5607	4609	6138	9847	9580	10409	8559	11907
Gross Margin per ewe	5.5	3.6	2.7	6.0	7.0	9.8	7.7	10.2	15.9	15.4	16.7	13.8	18.9
b) 1979/80 costs and prices													
FLOCK GROSS MARGIN	6813	4582	4648	9486	8927	9903	10059	11227	12405	9521	9546	8240	11907
Gross Margin per ewe	17.6	11.5	10.3	18.3	16.9	17.3	16.8	18.7	20.0	15.3	15.3	13.3	18.9

Table 7: Cash flow analysis of the marginal investment (£)

a) Prevailing costs and prices

	1969	1970	1971	1972	1973
Cumulative Balance	-1187	-2138	-1528	-593	1395
Valuation extra stock					7898
b) 1979/80 costs and prices					
Cumulative Balance	-4210	-7647	-5792	-4057	-1279
Valuation extra stock					7898
	-2279	2892	8378	10426	12268
					13021
					17912
					7898

ZERO

TILLAGE

FARMING

INTRODUCTION

My study of direct drilling took me to the Ministry of Agriculture, Experimental Husbandry Farm, Boxworth, to ICI at Jealotts Hill, Letcombe Laboratory, as well as to the National Institute of Agricultural Engineering.

Benefits of Direct Drilling

The structure of soil will improve on most soil types with direct drilling. These improvements will not show up for several years, as much of the improvement comes from an increase in the organic matter which builds up in the top soil, and also from a noticeable increase in earthworm activity.

This improvement in soil structure leads to a better seedbed because of the improved tilth. Better and a more even germination is achieved because more moisture is retained near the soil surface.

After four years of direct drilling at the Letcombe trials, the direct drilled plots contained 3.1% organic matter, as against 1.8% in the ploughed land, as measured in the top 2.5cm of soil.

In heavy clay soils moisture infiltration is increased, which increases the moisture retention capacity of the subsoil.

Because of this improvement, root development is also improved. Results from the Letcombe Laboratory show that roots penetrate the soil to a greater depth on direct drilled plots, which means that the plants will remove more moisture from the subsoil, and allow much better plant survival during a moisture stress period.

Results also show that in a dry year a yield increase of 14% was achieved on the direct drilled land, over the conventional system.

Trials from Boxworth indicate that direct drilled crops show a more useful response to nitrogen, which can be accounted for by the reduced mineralization of soil nitrogen, in the relatively undisturbed soil, and this has been particularly marked in the earlier drilled crops.

From trials at Letcombe the losses from all sources of nitrogen have been halved in direct drilled systems.

Plant establishment still causes problems in a direct drill system. Experience shows that drilling is best done when the soil will stick to the tine or coulter, creating greater disturbance in the soil, similar to that associated with shallow cultivation.

Boom Sprays

I was fortunate to be able to study spraying equipment at John Cyster's farm, as well as at Micron Air's factory on the Isle of Wight, and at the Chafer Bulk Liquid Fertilizer concern.

I had a most memorable visit to John and Margaret Cyster's farm. John Cyster was responsible for my visit to Micron Air.

The Micron Air spraying principle differs from the conventional boom spray jet. The fan-driven atomisers are powered by hydraulic motors which can be controlled to adjust the speed, which will change the size of the droplet.

The advantage of this machine is the droplet size. It is possible to spray liquid, as opposed to the conventional type of boom jet.

Trials done by John Cyster show that chemical strength can be reduced by 50% and still obtain good results, using this type of spraying head.

However, when reducing the recommended chemical rate, it is important to keep water volume at no less than 5 gal. per acre.

John says that the higher volume of water allows a greater spread and penetration into the target.

Tramlines

With a direct drill programme it is essential to have accurate spraying of fields, to avoid costly overlaps, or missed strips. To minimise this problem, a system of tramlines through a field has been developed. They are formed by blocking appropriate sowing tines to leave blank runs in a field. They are spaced to fit into the boom spray width.

Using the tramtracks, it is possible to avoid overlaps and missed strips. Trials at Experimental Husbandry Farms show that yields can be 2% lower, but that this is compensated for by cost saving in agrochemicals.

Straw

This is one of the greatest problems with direct drilling, and is the greatest disadvantage. At the Letcombe Laboratory they have shown that if straw is incorporated with the seed at sowing time, germination can be very low. Because of the break down of straw under wet conditions, microbes can compete with the seed for oxygen, restricting the germination. Fungi and toxins can be produced as well, further reducing germination.

At this point, the only satisfactory solution has been to burn the straw.

Straw Spreading and Disposal

As I arrived at the Velcourt farm amanged by Roger Waite, I was able to see the harvesting of a 9 ton hectare barley crop.

The straw from this crop was being chopped and spread across the working width of the harvester.

Roger Waite says that this method of straw disposal will lead to a more rapid breakdwon of straw, and mean fewer problems at sowing time.

Conclusion

The greatest benefits will be in the better soil structure and moisture availability.

The improvement in soil tilth will lead to better germination, and better root development will mean crops will be able to survive better under dry conditions.

Losses of, and the greater response to nitrogen will have beneficial cost savings as well as yield increases.

Many of these results will not be evident in the first few years, and it may take up to eight years before the improvements are obvious.

Tramlining will prove worthwhile as any loss of grain yield will be more than offset by the accuracy and cost saved in agrochemicals. Under Australian conditions one single line would be sufficient as a guide for spraying of fields, and the single line could be used for year-round spraying of direct drill systems.

Straw will not produce the same problems in Australia as in the United Kingdom, because of the lower quantities. However, straw choppers will be necessary on combine harvesters in direct drill farming systems, and should overcome many problems at sowing time.

From my studies, I am convinced that direct drilling will have a significant place in farming of the future and will be especially advantageous in the drier season we so often encounter in Australia.