



# **Defining the extent and source of manual handling problems in agricultural and horticultural enterprises**

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**RESEARCH REPORT 269**



# **Defining the extent and source of manual handling problems in agricultural and horticultural enterprises**

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This report presents the outcome of a study into the source and extent of manual handling problems in agricultural and horticultural enterprises. It involved visiting a small sample of a wide range of enterprises, some large and some small in order to identify typical manual handling tasks that occur in the industry today. By consulting farmers and growers, it was possible to observe the improvements they have made which reduce the risk of injury from manual handling tasks, to record any concerns that they still have, and any limitations that restrict further improvement.

The published results are in the form of case studies, and from the information gathered, and the observations made the report covers common problems, solutions, limitations and other observations such as the value of risk assessments (RAs), safe operating procedures (SOPs), and training as a means of reducing the risk of injury.

It was the intention to carry out a detailed analysis of some tasks that presented difficulties but this proved to be over ambitious as there was insufficient time during each visit and the timing did not always coincide with the tasks to be undertaken e.g. shearing sheep and picking tomatoes etc.

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## EXECUTIVE SUMMARY

The most recent survey of self-reported work-related illness estimated that 1.1 million people suffered from musculoskeletal disorders (MSDs) in 2001/02, including those caused by manual handling. These account for around half of all work-related ill health. As a result of MSDs, an estimated 12.3 million working days were lost in 2001/02.

The survey found that at 3.8%, people who had worked in agriculture in the past 8 years had the highest incidence rate of MSDs of any industry.

This study identifies typical manual handling problems occurring in modern agriculture and horticulture, looks at the steps taken to reduce the risk of injury, and examines what more could be done.

To ensure a valid assessment of manual handling problems across both industries, a wide range of establishments (both in type and size) were visited. In agriculture this included large and small arable, beef, dairy, pig, poultry and sheep enterprises as well as ones that had a mixture of these husbandry regimes. In horticulture, the enterprises included glasshouse production, nursery stock and fruit & vegetable production. Some were large employers, whilst others were family run businesses.

In trying to fully understand the extent and source of manual handling problems in agriculture and horticulture the report includes a series of case studies. These studies demonstrate the achievements of farmers and growers in reducing the risk from manual handling activities and the limitations (physical, economic, etc) they face in making further improvements. Along side these case studies, the researcher provides his observations on risk assessment, task analysis, innovations, the handling techniques used and the role of training.

The main findings of the work are:

Work in horticulture still involves significant levels repetitive manual handling that have the potential to cause MSDs. In contrast, recent technological developments in agriculture (eg bulk systems) have led to a reduction in repetitive manual handling tasks. However, there remain a large number of disparate, intermittent manual handling tasks which are unlikely to be completely eliminated.

Many of those working in agriculture suffer from historical MSDs which can be reactivated at any time by these disparate, intermittent tasks so training in how to reduce risks (through good working practices) and proper manual handling technique remains important

There is potential for further risk reduction in horticulture through greater mechanisation, which is likely to be economically driven. In agriculture, residual risk can be reduced through better design of products, equipment and buildings. These solutions, often developed by farmers and growers, need to be brought to the attention of manufacturers and suppliers.

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# 1. INTRODUCTION

In the last 25 years considerable changes have occurred in the systems of production used in agriculture and horticulture. Whilst these changes have been driven by the need to improve efficiency and productivity, they must be seen in the context of the European Common Agricultural Policy which until recently incentivised production without regard for demand.

In agriculture this has resulted in the intensification of animal and crop production to increase outputs per animal and per hectare. Allied with this growth in intensification (and profitability) came improvements to equipment, building and machinery which reduced labour requirements.

In horticulture, the increased popularity of gardening as a leisure activity has led to factory style plant production and distributions systems. There has also been an increased demand for year-round fresh fruit, vegetable and salad crops with a resultant proliferation of specialist growers focussing on producing one or two specific crops to supply all of the supermarkets.

The effect of these changes on the extent and source of manual handling problems in agricultural and horticultural enterprises is the subject of this study. The aim is to look at a wide range of enterprises and husbandry types, some being large employers with management structures some being small units run by a single family. Obviously, each farmer or grower has specific circumstances, which affect their ability to control the risk of injury from manual handling tasks. Whilst this study cannot deal with all situations, it does attempt to cover many of the common problems faced by people working in agricultural and horticultural enterprises.

After setting out the aims and objectives (section 2) and an overview of how the study was carried out (section 3), the main part of the report is devoted to the case studies of different agricultural and horticultural enterprises (sections 4 & 5). Section 6 then pulls together what has been learnt in the case studies and suggests solutions to some of the manual handling problems and the limitations on their adoption. Section 7 looks at and makes further observations on how people go about analysing the risks from manual handling along with general comments on the use of manual handling aids and manual handling techniques. Finally, section 8 sets out the conclusions drawn from the work.



## **2. AIMS AND OBJECTIVES**

The aims of the study were:

To analyse typical manual handling tasks undertaken in common agricultural enterprises such as arable, dairy, beef, sheep, pigs and poultry.

To analyse typical manual handling tasks undertaken in horticultural enterprises.

To meet these aims, three objectives were identified:

- i. To identify thirty enterprises (in the ratio one large to two small) of arable (cereals and roots) dairy, beef, sheep pigs and poultry, and including growers of fruit, vegetable and salad crops, glass house crops, and container production of Hardy Nursery Stock (HNS) at which to analyse manual handling tasks.
- ii. To analyse the manual handling tasks at these selected enterprises, to establish current levels of risk, practical steps taken to reduce the risk, and the constraints on the adoption of those steps.
- iii. Produce a written report of the findings in the form of case studies; together with observations of best practice in order that it may help others reduce the risk of injury caused by manual handling operations.



### 3. OVERVIEW OF WORK

To complete this study the work was carried out in four stages.

#### Stage one

Initially sixteen potential premises to be visited were identified, spread over four geographical areas (preferred by the researcher). This was eventually extended to twenty six, the list was compiled with the help of HSE inspectors in those areas, and by the researcher who had worked in the preferred areas.

#### Stage two

Work started on 15<sup>th</sup> December 2003, this was not a particularly good time to correspond with potential participants. Fortunately the visits were made in a quiet period for those involved e.g. January, February and March 2004 however it was a busy time for the fruit grower. The logistics for visiting had to be modified to account for bio- security measures that existed on some sites. After initial contact by telephone, a letter of introduction was sent to those taking part, followed a week later by a further call to arrange the date and time of visit.

#### Stage three

During the visits four methods of recording farmers' comments and activities were used:

- A task analysis sheet was used at the start of meetings to record farmer's views on any manual handling problems that they had (see figure 1).
- Digital images were taken, whilst being shown round the enterprise, these were a useful aide memoir when it came to writing up the report, and illustrating good ideas developed by those taking part.
- A Dictaphone used to record comments made whilst being shown round, was invaluable, as the weather and conditions did not always lend themselves to note taking.
- Three check lists were used to make sure that we had not overlooked any manual handling tasks. These were used towards the end of the visit, and it was quite surprising that they flagged up tasks that farmers and growers had not considered as manual handling, e.g. fencing.

As the analysis sheets used were blank (apart from the headings which helped focus attention on the important aspects of manual handling operations, namely; task, load, environment and individual capability) they allowed note taking to be flexible (not confined to the columns} and thus record farmer's opinions as well as the researcher's observations. The check lists were used in the same way (see examples in appendix 1).

| PREMISES:                              |   | TYPE & SIZE of UNIT:                             |                                 |   | CONTACT NAME:  |   |
|--|---|--|---------------------------------|---|--|---|
| <b>Task</b>                            | <b>Comments</b>                           | <b>Load</b>                                      | <b>Working environment</b>      | <b>Individual capability</b>                            | <b>Controls</b>  | <b>Limitations</b>  |
| Related to:<br>Preparation of tractors | Fitting<br>Changing                       | Wheel weights<br>Wheels                          | Outside or<br>undercover        | Trained<br>Experienced<br>Qualified                     | Range of<br>factors, systems<br>and equipment<br>that reduce the<br>risk of injury<br>(including use of<br>contractors). | Factors that limit<br>the ability to<br>eliminate<br>problems:                      |
| Mechanized operations                  | Handling seed<br>fertilizer etc.          | Trays (25kg)<br>Sacks (50kg)<br>Paper or plastic | Confined spaces<br>Work Layouts | Age<br>Gender<br>Health<br>Fitness<br>Old Injuries etc. |  | Cost<br>implications  |
| Spraying                               | Field scale or<br>knapsack                | Chemicals 5<br>litre<br>25 litre                 | Floor Surfaces<br>etc.          |   |  | Locked into<br>traditional<br>system  |
| Hay and silage making                  | Additives                                 | 205 litre drum<br>and bales                      |                                 |   |  | Old buildings   |
| Animal husbandry                       | Shearing,<br>dipping and foot<br>trimming | Breed, age,<br>size, behaviour<br>and work rate. |                                 |   |  | Lack of<br>awareness  |
| Harvesting<br>grading                  | Bagging and<br>palletizing                | Frequency  |                                 |   |  | Negative attitude   |
| Estate<br>maintenance                  | Fencing, walling<br>and hedging           | Gateposts,<br>fencing wire and<br>stone          |                                 |   |  | Capability of<br>operatives<br><br>Farming cycle:<br>(constantly<br>changing tasks) |
|  |   |  |                                 |   |  | et al   |

**Figure 1:** Task analysis sheet that was used during visits, showing examples of the expected findings.

## 4. CASE STUDIES (AGRICULTURAL)

### 4.1 ARABLE UNITS

#### 4.1.1 Large arable unit: Cheshire

The farm employs twelve men and is the base for office staff and the Health and Safety (H&S) coordinator who showed me around. All the staff have received manual handling techniques training.

They farm 1400 hectares of combinable crops, and there are 1000 hectares down to grass or set-aside under the Department for Environment Food and Rural Affairs (DEFRA) stewardship scheme.

Risk assessments have been carried out and measures put into place to keep manual handling injuries under control. To some extent this can be attributed to the fact that the growing of potatoes has ceased. They used to chit 5000 x 20 kg trays of seed potatoes a year. The staff that had chronic back problems left when potato production ceased.

Obviously the farm is highly mechanized and uses large tractors (including two on rubber tracks), and implements, including a taut liner for transporting seeds in bulk. This cuts out the need for sheeting trailers, which can be an awkward task.

Other items that make handling easier are:-

- “Lay flat” irrigation pipe, which avoid the need to carry aluminium pipes.
- A special self loading trailer for stacking big square bales.
- Fertilizer spreaders with a hydraulic attachment for handling big bags.

There is some handling of 25 kg bags, but most materials are handled in bulk or big bags. Chemicals are stored in 1000 ltr tanks and transferred by pump, but the staff find it irritating that some spray chemicals are only supplied in 10 ltr containers, and although they are decanted into a low level funnel on the self fill sprayer the requirement is 120 ltrs per fill. The HSE leaflet Manual Handling Assessment Charts (MAC) may help managers and suppliers find a compromise between weight of load and frequency of handling.

The farm has a large workshop and the staff have in the past, sustained injuries, and the accident book shows these have been caused by twisting whilst reaching or lifting, and lifting heavy gates or wheels. However, there have been no reports of injuries since they were trained in manual handling techniques, and although this may have been a coincidence, the staff believe that the training was beneficial and probably contributed to this reduction in injuries. Estate maintenance, especially laying concrete has caused difficulties, but concreting will, hopefully, be automated in future.

The H&S coordinator believes that although the advances in mechanization have been considerable, their real effect on back injuries may not be seen for some years, as many back injuries are historical.

#### **4.1.2 Small arable unit (potatoes): North Yorkshire**

Owned and run by Bob Shedden, 18 employees (male, with ages ranged between 20 and 63), plus female secretary.

The farm is 120 hectares of mainly potatoes grown for a chip producer, also a 4 hectare site for a pig unit, having 1500 breeding sows, and fattening 5000 pigs. Ten of the staff are employed on the pig unit, and eight on the arable side.

This highly mechanized farm has very few manual handling tasks, the large pig unit has automatic feeding, and the pig unit alone has five tractors, one with fore-end loader, a dumper truck, a fork lift truck, and a special loader for handling dry feed. The only specific problems mentioned during the visit were:-

- Moving pigs.
- Chitting seed potatoes, (filling trays at chest height and stacking on a pallet nine high, 25 tonnes in an eight hour day).
- Changing tractor wheels, (some large low ground pressure type). The wheels are taken from a pallet with the aid of a tractor fore-end loader, positioned upright near the axle and three men slide the wheel into position. This is made easier by placing a piece of sheet metal that has been lightly greased between the ground and the wheel.

In discussing the above problems the following solutions and limitations emerged:

- As the buildings and their layout cannot be changed without considerable capital expenditure they are finding it difficult to find a solution to the problem of moving the pigs, but all options are being considered. At the moment they rely on the handling skills of the staff, on the rare occasions that a dead sow has to be removed from a farrowing pen, a small hand winch is used to pull it into the passage, and a compact tractor tows it out of the building.
- This year they are not going to chit, and although some chits will be lost when planting, and plant vigour may be affected, it is hoped that the yield will be acceptable.
- The purchase or manufacture of a wheel changing device is now being seriously considered.

#### **4.1.3 Arable unit (Bagging Potatoes): North Yorkshire**

The reason for visiting this farm was to see if the bagging of potatoes caused any difficulties. John, the farmer, produces 2500 tonnes of potatoes to supply "Fish and Chip" shops and the wholesale market. A fork lift truck is used to load an 8 tonne hopper, the potatoes pass over a grader, through automatic bagging, weighing and stitching machines and finally up a conveyor which is set at an ideal height for carrying on the shoulder. The person loading the 25 kg bags on to pallets takes the bags straight onto the shoulder or turns them over, as this affects the ease of lowering them on to the pallet correctly (bottoms facing outwards). They load 30 bags on pallets for delivery and 40 on those for wholesale. John is aware of pallet turntables and their value but they

have plenty of space to move around pallets when loading. John's son does the deliveries and has a special (low loading) lorry for the purpose.

The staff were all trained to lift properly in the days of the Agricultural Training Board (ATB ) and to the best of John's knowledge nobody working on the farm suffers from back problems but his foreman has arthritis in his knees, they find working on the grader worse than loading pallets. They used to make up 1200 trays of chitted potatoes which was also arduous but now only chit a few trays of earlies.

## **4.2 BEEF UNITS**

### **4.2.1 Large beef unit: Cumbria**

The farm has 650 hectares of land with housing for 440 breeding cows, 30 followers and calves that are sold as store cattle at between 300 and 400 kgs. (they also have 2000 sheep). Robert has four other men working for him aged 20 to 40, they have never been off work due to musculoskeletal injuries but they do get aches and pains as handling cattle is hard work. Robert is convinced that people working in farming need to be fit to do the job.

Robert has no particular manual handling problems as he has the facilities to handle the animals. They graze on the fell from April to October (weather permitting) and are housed through the winter. The housing consists of a new building that has curbs alongside walls and either side of the yards so that the gates can be fastened open but are protected by the curb when scraping .The floor slopes to provide drainage and this gives the animals a dry area at the opposite end of the pens. He thinks that standard buildings are not as flexible as he would like and has constructed an inner pen for calves that can come and go as they please within the main pen. They need straw bedding and he is considering an extension to form a loft for storing straw.

The old building is long with a passage down the middle and is connected to a covered silage clamp that can also be utilized for housing when empty, it has a loft at one end for storing conventional bales, it is hard work loading them into the loft but they can be dropped into the pens and they are easier to handle than big bales in this type of building. There are also yards around these buildings with feed troughs and the whole area slopes to a slurry lagoon.

He uses a telescopic loader for handling silage, for placing tyres on top of the clamp and for handling big bales, these are partly spread by machine and the remainder are hand forked. The only manual handling is 25 kg bags of concentrate, 25 ltr drums of chemical and gates. The latter is a two man task as they have to be sturdy, and are therefore quite heavy, and their maintenance is a time consuming operation, the problem being that slurry and silage effluent is very corrosive.

There is some hedging and fencing work, however these are reasonable tasks because the hedges are either cut by a contractor, or if laid, the work is at a reasonable height as they are grown on sod embankments. The fencing materials are handled on pallets and a mechanical post knocker is used to speed the job up.

Animal handling is made easier as staff walk through the pens that hold thirty steers on a regular basis and the animals get used to their handlers from an early age. Robert always sticks to the same procedure when entering the bull pens so that they get used to the routine. The cattle handling race is situated so that the cattle are heading

towards the light and the restraining yoke is an excellent design which Robert says “is the best piece of equipment to be developed in ten years”, this all goes to make handling easier. In the long term he would like a mobile unit for containing animals in remote areas, as the farm has a small amount of meadow land which is almost at sea level, but the majority is on the fell, rising to 300 metres.



*Kerbs to protect gates during slurry scraping*

#### **4.2.2 Small beef unit: North Yorkshire**

This beef unit is part of a 485 hectare arable unit; it has 50 suckler cows and 25 heifers, plus 110 ewes. The farm is managed by father, son and daughter, Fiona, who showed me around, it is run with the help of four men aged between 38 and 50, one has a congenital joint problem in the foot, and another has a lower back pain (LPB) which is treated by an osteopath.

They have purpose built housing for the beef cattle with a feed passage, bull pens and a race that has a very good crush, with the same award winning yoke as mentioned in 4.2.1. This together with a change of breed that calve without assistance, and by eliminating dehorning with a chemical paste, has solved their problems on the beef side.

Fiona is happy with the system and equipment for handling the cattle but wishes that she could say the same for sheep handling equipment. The main problem is that of turning sheep for foot trimming, they are using their second choice of turnover crate (the best yet), but it is not totally to their liking, as some of the sheep can weigh up to 100 kg, and the equipment is not always strong enough or that easy to use.

A telescopic loader is used for handling round bales (1.2 m in diameter), they have tried a blower for spreading straw, but prefer to use a team of four or five people (one watching the cattle) to roll them out, round silage bales are unwound by machine. Some feed is mill and mixed on site, it has a dispatch platform that has been raised to make handling easier, and they use a combination of pallet cage, trolley and four wheel hand truck for transporting the 25 kg bags of feed that have been made up. The pallet cage can be handled by a FLT and the trolley has a good wheel configuration, e.g. fixed wheels at the front and castors close to the person pushing it.

The manual handling tasks also include hedging, a small amount of planting, laying and fencing, the all terrain vehicle (ATV) is useful for transporting materials. There is also some mucking out by hand in the old stables but these are only used for ewes and lambs.

## **4.3 DAIRY UNITS**

### **4.3.1 Large dairy unit: Cheshire**

A number of large units belonging to the one estate, were visited, including a breeding bull stud, one of four dairy units, and a heifer farm.

#### ***The bull stud***

This unit is operated by six staff, (that all took part in the survey) but also has admin and laboratory staff. I was given the opportunity of observing the men handling the bulls and teasers during the task of collecting semen for the laboratory. Although they were handling large animals all day they enjoyed the work and had few causes for concern, however, all but one had sustained back injuries in the past. Their ages vary between 33 and 55, are all experienced agricultural workers, and had been trained in manual handling techniques, and specialist skills such as foot trimming.

Although their main task is the collection of semen, other tasks included, washing artificial vaginas (AVs), feeding, bedding, mucking out, washing animals, foot trimming and handling disinfectant. They had an excellent roll-over crate which made the foot trimming a comfortable task, yet the sinks used for washing and sterilizing the AVs and their cones was too low. These could easily be raised to suit the user, thus avoiding a pronounced stoop. As fifty items were washed each time, this was the task that was found to be the most arduous. If the operator were to side step when placing the articles into the sterilizing sink repetitive reaching and twisting could be avoided. This was a good example of how risk reduction does not have to have an expensive solution, and also that training needs to be related to work activities.



*Roll-over crate for foot trimming*



*Example of poor wash station design*

### **The dairy unit**

The staff from three of the dairy farms met with me and the dairy farms manager to discuss any manual handling problems that they encounter in the course of their work. Their main concern was carrying calves from the calving shed across the yard to the calf pens. A calf trolley exists but is not always used, as some calves will walk and others are carried to save time.

The second concern was dealing with “downers” (cows that cannot stand up), especially in the cubicles, as access to them is difficult. Downers are rolled or slid round, and with the use of a telescopic loader bucket, they are lifted and tipped into the straw yard. Manufacturers make a wide range of attachments for loaders and it would appear that a need exists for the design and production of a device to deal with this problem.

We then looked at methods of handling 205 ltr drums of teat dip into the parlour. I demonstrated a number of manual methods but recommended the use of a drum handling trolley.

After the group discussion one of the herdsmen showed me round the milking parlour and cowsheds, and a number of minor concerns were pointed out to me:-

- Due to teat end damage, two lightweight clusters were on trial; these would be advantageous to the cow, but would also be of benefit to the herdsmen who are reaching to attach them. Between 140 and 240 cows are milked three times a day, so although the load (cluster) is light the frequency is high.
- Emptying the waste (wipes) bin, a two man job.
- Slipping and falling in the parlour.

- Foot trimming using a mobile crush, as nervous cows can make it unstable.
- A barn door had to be replaced onto its hinges by four men, if the manufacturer had provided lifting points, this could have been done using a loader.

Finally, the herdsmen showed me two methods that he uses for carrying calves, one for short distances, and one for long. The dairy unit was otherwise mechanized as far as reasonably practicable.

### ***The heifer farm***

The livestock manager has five stockmen, and the office staff and two vets are based at this farm. There were no major problems as they use skid- steer and telescopic loaders, straw spreaders, and a tractor mounted device for sweeping feed back into place. There is some manual handling of 25 kg bags of calf feed and 25 ltr. drums of chemical. Gates and partitions are lifted manually as muck builds up, this is limited by the length of hinge pins when mucking out must take place. 205 ltr drums of needles and surgical waste are removed by a contractor that provides this service.

Calving, calf feeding and moving is the main work of the farm, a four wheel calf moving trolley exists, but it could be improved. If it was adapted so that both axles pivot, and linked with a track rod, front and rear wheels would then follow the same turning circle, an advantage in confined spaces (see section 7.2).

#### **4.3.2 Dairy unit: North Yorkshire**

Owned and run by Wesley (54) assisted by wife, Jean, and son Matthew (27), also two relief milkers. The farm is 140 hectares to grass, 240 cows in milk, 30 dry, and 200 followers (new born to in-calf heifers.)

Wesley and Jean moved in recent years from Long Marston, a traditional Yorkshire village with farms in the main street, having land at the rear for buildings and grazing. Each farm had a portion of Marston Moor for the growing of crops. The farming systems (cow kennels) and machinery had to suit the buildings and space available, and there was considerable transportation of materials to and from the fields. Smell, mud and slurry was considered a nuisance to village residents.

Wesley and Jean took a bold move and bought a redundant pig farm near Easingwold, and converted it for use by their dairy herd. Fortunately it was possible to design the system, and adapt the buildings, to suit the machinery that was to be used, namely, a telescopic loader. This allowed almost all the handling of materials to be mechanized. The use of machinery is kept to a minimum by using contractors for the production of silage, leading straw and muck-spreading.

Both Matthew and Wesley have sustained back injuries in the past; Wesley developed a problem with a vertebra caused by bending for long periods whilst training calves to feed from a bucket. He had a recurrence whilst throwing tyres from a silage clamp. Matthew, who is 6'1", developed lower back pain (LBP) when he worked at a plant nursery during a gap year. Many of the tasks involved stooping, e.g. hoeing, and handling container plants. Both have received physiotherapy and been given exercises to relieve the problem. Matthew is very aware of the need to raise the working height of loads to be handled and to rest 25 ltr drums on something when pouring chemicals (teat dip).

However a small table by the steps into the parlour would provide a better place to store drums during decanting.

As most of the work of the farm is either mechanized or contracted out, their day to day manual handling problems were few, however, their main concern was the training of newborn calves, to feed from a bucket. They have now adopted a system whereby the calves are fed from a bottle for the first few days which is better for the calves, and also for the person training them, as the transition from bottle to bucket feeding takes less time.

When the buildings were adapted to take the milking parlour, the working height was deliberately designed to suit the herdsman, and discourage Wesley from using it. Happily the working height suits Matthew and the relief milkers who are all approximately the same height.

## **4.4 MIXED UNITS**

### **4.4.1 Large mixed unit (arable, pigs and sheep): North Yorkshire**

Brothers Peter & Geoff, Both over 60 years of age, are assisted by one son (25), and two part- time casual helpers with potato grading, husband and wife, both in their 70's. The farm is mainly arable, including wheat, barley, potatoes, oil seed rape and turnips. There are also 900 sheep, and between 200 and 1000 pigs. They are part of the DEFRA Countryside Stewardship Scheme aimed at improving the environment, and at reducing the use of chemicals. They are anxious to keep their clients happy, and refer to their methods as natural farming.

Both brothers have a history of back injuries, and recall the cause as being a simple task such as picking up a bucket. A physiotherapist that they consulted explained that the cause was more likely to have been accumulative, and they were advised to stay active and to keep themselves fit. Geoff goes skiing once a year, and uses a treadmill to prepare himself for his holiday. Peter found that a day's beating at a shoot helped to reduce the discomfort.

Tasks that give them cause for concern were:-

- Fitting deck boards into, and hitching their livestock trailer to a Land Rover.
- Pulling polypropylene bands from big bales as they tend to snag suddenly.
- Fitting and removing front end weights to a tractor.
- Removing webs from potato harvesting and grading machinery.
- Sheeting lorries.
- Changing tractor wheels.
- Climbing on potato and grain heaps.
- Working with sheep, as the tasks tend to be seasonal, and it takes time to get used to them.

The farm is well equipped with tractors and large implements, including a telescopic loader so that all of the arable operations are mechanized, they use bulk seed, and liquid

fertilizer and chemicals. The potatoes are handled using boxes that can be tipped, so that manual handling is kept to a minimum.

#### **4.4.2 Small mixed unit (dairy, beef and sheep): Cumbria**

Three brothers, aged between 48 and 51, run the farm for their father who is 73. The farm consists of 220 hectares of grass either side of a road that runs through a valley in the south of Cumbria. They milk 40 cows, rearing all their own stock, and have 45 in-calf heifers, 150-200 bull and heifer calves which are reared for eighteen months, to 500kg. There are also 1200 ewes, and the hogs produced go for sale.

The brothers have never had any back problems, but commented that muscles do ache at the end of hard day, they put the absence of back problems down to the fact that they are short (168 cms) and stocky and are used to the work. One does the milking and the other two look after the beef and sheep respectively.

There are two sets of farm buildings, one centuries old built of stone with slate roofs, the other is a number of fifty year old steel framed building that house the cubicles, herringbone parlour and feed store. There is a silage clamp adjacent to the road and between the two farmyards, making transport straightforward. Because of the problems of converting the buildings there is little scope for changing the farming methods, but mechanization has been introduced where possible. A skid steer loader is used for handling silage and bedding and a tractor scraper for mucking out, the muck being scraped to slats over an underground tank at one end of the building. This is emptied weather permitting, on a regular basis. The feed passage is also scraped once a fortnight to prevent any residue fermenting. All bedding is bought in and can be of almost any form, e.g. big round or square bales, conventional bales, or waste paper pulp, which apparently is very absorbent.

Feed for the cows and beef is mainly their own silage (clamp and big bale) plus some hay in the form of conventional bales, cake is purchased in bulk. Up to 100 sheep are kept inside over the winter e.g. hogs that are on the light side, and any that are lame. The barn used is easily accessible for bedding and feeding and is cleaned out in March or April.

Although the buildings, and probably the profit margins, limit development, the brothers do seem to recognize opportunities for making life easier, for example, they have a new livestock trailer with a pneumatic lift for the ramp, and small things such as a wheelbarrow wheel fitted on the end of a wide gate in the farmyard, and a big bale spike attachment left in a bale so that it can be attached easily when needed.

### **4.5 PIG UNITS**

#### **4.5.1 Small pig unit: North Yorkshire**

Three brothers all in their twenties plus a part-time friend of the family, (all trained and qualified), very fit, no history of injuries, and no major concerns.

Mainly pigs: 2700 plus 140 cattle, raising calves to 500 kg. live weight (550 kg if bulls), and some arable crops including oil seed rape and corn for their own feed.

The pig unit is adjacent to the old farmhouse and yard, on a slope, and with an aggregate surface between buildings. It was very muddy on the day of visit, but I got the impression that the main priority was making the farm business viable, and that new sheds would come before a concrete or similar surface around the buildings.

Tasks that did give some cause for concern:-

- Weighing pigs and returning the weighing equipment to the storage area (up a muddy slope, an arduous task).
- Moving pigs generally.

They recognized each other's abilities, had clearly defined roles, and worked as a team. Following the recent death of their father, they are obviously anxious to make the farm viable, and put hard work and physical effort before the value of spending on questionable cosmetics. Expansion of capacity and production comes before improved road surfaces. However the problem of wheeling equipment up the difficult slope could be made easier by constructing a path (at reasonable cost) alongside the track.

There was some manual handling that would appear quite difficult according to the guidance given in HSE leaflets, namely the 50kg bags that they make up and carry into the building for feeding sows, however, this is done by choice, to save time and appears to be within their capability. The bags do not have to be filled to capacity, and a tractor with a fore-end loader and bucket is used to transport them from the hopper to the sow house.

**4.5.2 Other pig units:** A large unit has been discussed in 4.1.2 and a small pig unit is mentioned in 4.4.1 plus a farmer that owns a small pig unit gave me the benefit of his experience which I have drawn upon in sections 6 and 7, but he wishes to remain anonymous.

## **4.6 POULTRY UNITS**

### **4.6.1 Large poultry units (meat production): Shropshire**

In order to study poultry units a large food company was approached, and they agreed to help. The company has an integrated farming system managing arable and livestock farms, and they have their own feed mills to supply the beef, pig and poultry units. I was guided around the poultry division by the Human Resources (HR) manager, and introduced to the managers of the rearing, laying and growing farms, and also the hatchery.

The company as a whole employs a large workforce, but apart from the hatchery the staffing levels are relatively small. They have an impressive induction programme (including manual handling training), detailed risk assessments (RA) have been carried out, and safe operating procedures (SOP) put in place as a result. However, 38% of their reported accidents are the result of manual handling, and they intend to combine RA's and SOP's which will be enhanced with images to help raise awareness of the problems amongst operators.

The main concerns they have are stock handling during placement, catching and cleaning. Placement involves setting up pens, perches, fan covers (to exclude light), drinkers and feed tracks. This is part of their normal duties, but for catching specialist teams are used. Some are their own employees others are contractors. Removing waste litter is also contracted out, as skid steer loaders are used. The manager of these farms is convinced that the manual handling (e.g. raising watering lines and feeders, removing fan covers, gas heaters and fences) is made worse by the sudden change, after nineteen weeks of a quiet, routine, work schedule to the urgency during cleaning, with vehicles moving in and around buildings. This appears to be a complaint amongst many livestock farmers e.g. muscle fatigue when getting used to new tasks.

### ***Rearing Farm***

This was a converted broiler unit (villagers objected to bulk lorries passing). There are fifteen sheds available but they are only using five, with 7500 birds per shed. Setting up involves bolting 2 x 3 metre fences together (a two man job), cutting 25 kg bales of wood shavings in half and spreading for litter, installing watering lines to supply "bell" drinkers that are permanently in place. They are in the process of changing from hand scattering of feed over a 10 x 20 metre pens (for scratch feeding) which requires ten 10 kg buckets per pen, e.g. four tonnes per day to new automatic spinners that will eliminate this. Another important development has been the introduction of platform weighers that are linked to a computer. This has eliminated hand weighing of hens. Cockerels are still weighed and fed by hand. The only other manual handling task is the vaccination of birds which passed over a dividing fence.

Catching is still the most arduous task, as the work involves stooping and is carried out in subdued light. They catch 4-5 birds at a time and place them in trays that slide into a module rather like a chest of drawers. The manager described the old method where one person went down on one or both knees to catch and pass back to someone loading the birds into the module. He also mentioned that harvesting machines are also available, but they only suite conditions where the litter is level and the possibility of breakdowns is a concern. These birds are prized as they are the next generation of laying hens; therefore flock management is very important.

### ***Laying farm***

The production of eggs was almost completely automatic, as they used auto-nests. The eggs roll onto a conveyor which carries them through the end walls to table heads that are watched via CCTV. A cross conveyor takes them out of the sheds, and under a road to the egg room. Here they are automatically loaded onto trays which are manually loaded onto special trolleys. The trays complete with eggs weigh 8.5 kg are placed as low as 150 mm and as high as 2 m on the trolley, which when loaded weighs 350 kg. The wheel configuration is good (e.g. fixed wheels at the front and caster wheel close to the operator pushing the trolley), and thus easy to steer. However, the trolleys do not have handles as they would break eggs when pushed close together in the cold store. The company is looking into the development of removable push bars as operators tend to catch their knuckles the way they are used at the moment.

Feeding is also automatic, they use tracks for hens, and bell feeders for cockerels, and they avoid the need to climb steps in order to add chemicals for water purification into

the header tanks by using a bulk tank with a pump. The only manual work is handling 20 kg bags of grit and preparing for catching and turnaround. The system allows more time to check the eggs for size and placement (e.g. the right way up) which can increase productivity.



*Trolley stacking involving high and low level work*

### **Hatchery unit**

Work there consists of taking trays of eggs from trolleys and placing them in an incubator, and then to the transfer room where a machine automatically transfers them into baskets ready for loading into the hatcher. The work has to be done quickly as the eggs are out of the controlled environment. When the chicks hatch they are taken to an area for sorting and sexing, the baskets are taken from a pallet and placed on the sorting bench by one of three operators, (they take turns in this job). The chicks are checked and the vast majority (healthy ones) are placed on a conveyor that takes them to the sexing carousel, and the trays are conveyed to a tipper that empties the shells before going through an automatic washer.

A team of ten people check the wings in order to separate the chicks by sex, this work is more likely to cause a work related upper limb disorder (WRULD), as the work is very repetitive, (two hour stints with 45 min breaks). The chicks are replaced in baskets for dispatch to the farms. Teamwork and job rotation is the method of reducing the risk of injury.

### **Growing farm**

Three employees look after 190,000 birds in 12 sheds, the work consists of spreading litter, hand winching to raise drinking and feed lines, weighing birds by hand and collecting dead birds. However at turnaround they have to raise the drinking lines, (they use a 110 volt electric drill to operate the winch), remove long and short fence sections, and curtains at the doors. After catching, the contractors remove waste litter and spread with new, when permanent staff can replace equipment, roll out sheets of paper over the litter, spread with feed and unload baskets of chicks delivered on pallets.

Trolleys are used to transport the bales of litter, the bales are cut in half for spreading, and it is a matter of choice as to how many trays of chicks are carried at any one time, bearing in mind that operators are working in low light levels and stepping over feed tracks. Usually one at a time for high and low level, but two or three when the baskets are at waist height. The same policy exists when collecting dead pullets in a bucket, and cockerels that weigh up to 5 kg each (maximum 5 per bin bag).

The company is large enough to employ full time health and safety and HR. specialists that can monitor health and safety issues, and introduce safe systems of work and in-house training to reduce the risks as far as is reasonably practical.

#### **4.6.2 Small poultry unit (Egg production): Cumbria**

This 6 hectare farm has two battery sheds and one free range building that Mark, the farmer, constructed himself. He has 8000 birds for egg production, including 1000 that are free range (a new enterprise). He has two part time helpers that each work two days a week, and is also helped by family and friends. He delivers the eggs himself to local shops, guest houses, hotels etc.

The eggs are collected by hand from the two battery units, using a trolley to stack the egg trays, and to transport them to the egg room. The free range unit has auto nests and a hand wound conveyor that delivers the eggs to one end of the building during collection. The trays are carried to the adjacent egg room where they are stacked on the floor. Here they are passed through a grading machine, and the trays of graded eggs are then stacked on shelves around the room, and in an adjacent store.

Feed is bagged off (25 kg) from a hopper, loaded into the back of a 4x4 vehicle and transported the short distance to the battery and free range shed in order to fill the feeders. Mucking out involves winding the belt conveyor, using a portable power unit (it is wound by hand on return).

A steady turnover of birds (350 per month) is required in order to maintain egg size, the difficulties larger unit face is avoided. Mark has yet to decide what system he will adopt for replacement of the free range hen, probable ringing them. The old hens are purchased by a local zoo.

With a little more forethought and investment the free range development could have been linked directly to the egg room and a new bulk hopper (which he is thinking of getting) could have supplied an automatic feed system. However it is uncertain whether the demand for free range eggs will increase.

## **4.7 SHEEP UNITS**

### **4.7.1 Large sheep unit: Northumberland**

Park Farm is a 1200 hectares unit which is part of an estate, and there are 450 hectares available for sheep. The livestock manager and a colleague look after a flock of 2400 ewes, 1800 of which are inside two sheds. The manager has not had any back problems for five years, but has had two injuries in the past that were put right by a physiotherapist, his colleague has had some muscle injuries, and has a knee injury which is due to be operated upon.

They have been allowed to develop a simple system that reduces the manual handling of materials and animals to a minimum. Feeding involves placing big bales of wheat straw into the pens using a loader operated by one man, whilst the other turns the bale on end and removes the netting. The sheep forage for what they need to eat and spread the remainder for bedding. It takes two men half an hour every morning to handle sixteen bales (eight per shed). Compounds in the form of 14 mm. pellets are transported in a four wheeled trolley from a hopper to the shed, and is scattered over the whole area of each pen (14 m x 7 m) with a scoop that holds 2.5 kg. every 36 hrs. When feeding compounds in the field the same pellets are dropped by a spreader drawn behind an ATV which dispenses a measured quantity at intervals along the field. This avoids the need for emptying 25 kg. bags into troughs at ground level, a common practice elsewhere.

Shearing is contracted out, but their own mobile unit is used (trailer) which can be set up by them in order to give the contractors a good start. Foot trimming is carried out using a "turn over" crate, and instead of dipping, the sheep are put through a device which treats them by hydraulic jets that are triggered to spray 2 ltrs. per sheep. The chemical is pumped from a 1000 ltr tank into the spraying device.

Lambing is their most arduous task as it involves handling ewes in pens, but a special trailer has been built for moving ewes and their newborn lambs to fields. This has a central division that has boxes along the top in which the lambs are placed, the ewes follow, and a gate is closed behind them, this is repeated to house ten ewes each side. In the field, one man drives the tractor and trailer, whilst the other drops the tail gate (ramp) and lets out individual ewes, and places their lambs with them.

Mucking out is carried out once in February, then in March and finally after shearing in mid-May, it is mainly straw and a fore end loader is used. All field work is contracted out, and the estate maintenance is done by a separate department.

The unit is a credit to the manager and his assistant, it works well for them, and the sheep appeared very calm and content. They have been given the freedom to develop this system and to select appropriate equipment, e.g. light aluminium hurdles etc. Animals are moved with ease, and this is put down to good management of the flock, cunning (understanding animal behaviour), and having the right temperament themselves.

#### 4.7.2 Small sheep unit: Cumbria

Arnold Lancaster, aged 60, is a tenant farmer who did have 1500 sheep, 32 cows plus their calves, he worked all hours and his facilities for animal husbandry were out side. Eighteen years ago he injured his back whilst lifting a wooden barrow during mucking out, this required key-hole surgery. His surgeon advised him not to use a lumbar support, or to overdo things, but to stay as active as possible. Two years later he sold much of his flock and now has 450 sheep, of which 350 are ewes, and some pedigree breeding rams, which he finds manageable. When the owner died, he bought some land and buildings from the new owner, which he now uses as his base.

Although the old handling system was outside, it was situated between two paddocks, and worked extremely well. It is based on a semi-circular holding pen that could take 30 sheep at a time, and a "sweeping" gate. He would take 15 sheep at a time and run them through either, a foot treatment trough, a dosing race or a dipping bath. When dipping the sheep, they are turned so that they fall into the bath hind legs first, with his foot he pushes the head under, and then turns the sheep. The dip takes two sheep at a time and he lets one out through a "guillotine" gate (operated by a pull cord) as he turns the second sheep. When 15 sheep have dried off he releases them through a second guillotine gate to a holding area. As he has a paddock for sheep waiting, and another for those that have been treated, he can take a break whenever he wants.

His new system is based on the old, but he says that he will be surprised if it works as well. The sheep are held in his yard and are funnelled into the shearing shed that he has designed and built himself; it has a holding pen with a "slammer" gate, which enables the person shearing to walk in and back out with a sheep to be clipped. Clipping is carried out on wooden decking, and there is an area behind this decking which provides space for wrapping and storing the fleeces. He is in the process of constructing a covered area and system of gates, adjacent to the new shed, which will replace the old system for dipping and dosing. We discussed ventilation and the use of sheep showers, and although he recognizes the benefits from a safety point of view, he is not convinced that the sheep get a good drenching, and that dipping is certainly better for the treatment of scab. Hopefully the benefits of shade in hot weather will out weigh the lack of ventilation.

He is a remarkable man who is not afraid of physical work, he can handle sheep with ease (as demonstrated on one of his tups), he is an accomplished stone waller, and his welding and fabrication skills are considerable. He has designed a hinge, basically tubes that fit over a tubular metal gate post, which allows 360 degrees rotation of the gate, making the use of the shed very adaptable. (At present it houses 8 calves for fattening).

The livestock trailer that he uses requires the ramp that gives access to the upper deck to be lifted manually, this is a difficult task with sheep on the upper deck, so he intends to purchase a new model that has light weight aluminium decking that folds away when not in use, and a tailgate that can be raised pneumatically to form a ramp to the upper deck. The old trailer will be adapted and used as a bulk container for his animal feed, which is currently purchased in 25 kg bags, making a saving of £50 per tonne.

Arnold is a person with an independent spirit, who has a small enterprise that might be considered unviable, but as long as it is run in a cost effective yet manageable way, provides him with an enjoyable way of life.



*Modern twin deck livestock trailer with lightweight aluminium ramp*

## **5 CASE STUDIES (HORTICULTURAL UNITS)**

### **5.1 GLASSHOUSE UNIT: WORCESTERSHIRE:**

Chris and Janet Harvey own and run a tomato nursery with 1.6 hectares of glass in an environmentally sensitive area. The whole unit is immaculate in appearance, well equipped and efficiently organized, (on arrival Chris handed me a list of their manual handling activities), they are also part of an assured quality scheme (AQS). Seven staff are employed, (one female) aged between 30 and 55, on a full time basis, as the growing and picking season lasts twelve months. The nursery is on a slope with the pack house at the bottom, there is concrete hard standing in and around the glasshouses, and a tarmac road down to the pack house.

The tomato seeds are sown by hand into polystyrene trays to produce plugs, the trays are laid on the floor of the propagation house for ease of watering, but transplanted into rock wool cubes at bench height. The propagation house has a heated floor, sodium lamps, and the plants are grown by the nutrient film technique (NFT), automatic liquid feeding system. The vines are layered as they grow (trained and tied to wires), as the vines can weigh between 4 and 5 kg due to the already formed fruits, and the task involves lifting the plant from the wire, lowering it, and then re-tying, it could lead to repetitive strain injuries (RSI). This task is a weekly job, and operatives can manage between 200 & 600 plants per hour.

Other tasks involve trimming, (removing unwanted leaves) carried out using a trolley with a seat that runs along two pipes, manoeuvred by the person's feet. Waste leaves are swept to one end for collection. The same pipes (rails) are used to carry a motorized trolley for layering and picking at high level, and a hand trolley that can take two buckets, for picking at low level. The tomatoes are placed into a small four wheeled tipping bin which can be wheeled to the packing shed for grading, weighing into trays and palletized for wholesale. At the end of the harvest the stems are rolled up and collected with a buck rake mounted to a compact tractor.

Chris has devised a system which has reduced manual handling where possible, but recognizes that although the weights handled are low, the frequency of handling is high. He carries out risk assessments as part of the AQS, and we discussed the value of using the graphs published in the HSE manual handling assessment charts, (MAC), and manual handling techniques training.



*Low level seat running on heating pipes*



*Tipping hand truck*

## **5.2 HARDY NURSERY STOCK (HNS) UNIT: CHESHIRE**

The production manager has 20 staff between the ages of 18 and 53 (one started at 17 and another recently retired at 65). There is a mixed workforce of male & female.

This nursery is one of a number of large HNS producers that I first visited approx. 15 years ago. I was impressed with their system of handling materials then, and was even more impressed during my visit in January 2004.

They currently use three systems:-

- “Bomb” trailers (their term), small four wheeled trailers with a turn table on the front axle, they can be linked together to form a train, and are pulled by compact tractors. They are ideal for moving container plants to and from the container site. The trailer beds are approx. knee high, 2 m. long and 1m wide. A larger version (4 m x 2 m) waist high is used for larger containers, items in terracotta pots, and root balled plants. They double as a work bench when preparing potted plants for sale.
- “Danish” trolleys (DTs): these are used throughout the industry on lease hire, they are designed for the easy loading of lorries, but are ideal for moving plants between hand potting areas, the propagation house, and dispatch or garden centre (where fork lift trucks cannot be used due to public safety). They are small, light and the shelves are adjustable to suit plant height. They run on four wheels, the pair closest to the handler are on castors (having breaks), so they are very manoeuvrable. If they are used to transport heavier plants, or over long distances, then they can be moved on pallets using a FLT, or a special trailer. This trailer has a hydraulically operated tail gate that forms a gentle sloping ramp for ease of loading, a stabilizing bar if carrying two DTs, but can carry four. When transporting plants to the garden centre there are designated access points for off-loading, thereby avoiding contact with the public.

- Mobile benches are currently used for raising small plants in the propagation and growing houses, the intention is to have an integrated growing and transport system. The benches can be rolled from a machine that pots up plugs (no hand potting) into the growing area and then outside for hardening off, or onto special “dollies” for transport to the garden centre. They can also be used for displaying the plants. The benches will stay at one level throughout the growing, transporting and display phases. They are light enough to be lifted by two people if necessary and the company is looking at the possibility of mounting them on the bomb trailers to give maximum flexibility.
- Other items of equipment used are: pallet trucks, fork lift trucks, telescopic loaders, a “multi-stack” (a container approx 4 m x 2 m x 3 m high, that can be mounted on a trailer, the top shelf is only used if it standing on the floor, or for moving empty returns), and a mobile potting trailer.

As the production manager and I focused on the various systems and their benefits, we did not discuss the extent of manual handling injuries amongst the staff, in fact there was very little opportunity for me to have contact with the operatives. However, it was obvious that the company has a policy of protecting their employees as far as reasonably practicable. The deputy managers carry out risk assessments, including those for manual handling tasks, and try to reduce manual handling to a minimum, by adopting bulk handling, big bales of compost, the systems mentioned above, and by avoiding the use of specialist staff. They prefer staff to undertake a wide range of tasks, so that each individual spends less time on tasks that may cause musculoskeletal disorders.

Although the company has mechanized as far as possible they, like all nurseries, have a wide range of manual handling tasks such as : pruning stock plants, hand and machine potting , root balling, putting down and collection on container sites, moving palletized loads, e.g. pushing and pulling pallet trucks, watering plants, planting whips and tree lifting. Although the tractors are on lease hire, and use a local engineer for development work and the manufacture of trailers, they do have a workshop for repairs, which would involve manual handling activities. All staff receive manual handling training and the company has two instructors on the staff to provide this.

These and other risk reduction measures will be discussed further in sections 6 & 7.

### **5.3 TOP FRUIT (APPLES): WORCESTERSHIRE**

Paul Dunsby, his son Nicholas, and his wife have an apple orchard extending to 125 hectares, with a pack house and cold store. They supply supermarkets, and pack apples for seven other growers, grading and packing 20 tonnes per day, between August and late February. They employ between 12 and 15, (25% males) full time staff, and 40 casual workers for picking in August and September.

The trees are a variety that can be kept low, so that pruning and picking is done at ground level, avoiding the use of ladders. An orchard sprayer and water bowser are used for chemical treatments. The pickers have buckets with a canvas drop chute, and the apples are placed in pallet boxes, for collection by a tractor with fork lifts, front and rear.

The packing lines are fed from a tank into which the boxes are lowered by a FLT, the apples float off, (assisted by hand raking). The apples are graded by weight, and

therefore size, electronically, and moved to different lines for hand sorting. They are placed in trays (two per box) to make up boxes of 10.8 kg or 12 kg, these are stacked eight to ten high on pallets. An electric pallet truck takes them to the cold store. Sub-standard fruit is thrown into crates under the packing lines, and when the maximum manageable weight is reached, they are taken and tipped into a waste box. These apples are sold for cider making.

The need for manual handling techniques training was discussed, but the techniques being used were good, the argument being, that if poor technique was used then by the end of a thirty seven hour week, the person would be well aware of the consequences. However, I observed that the pallets were far enough away from the packing lines to make a few steps necessary, and hence, avoid the temptation to bend, twist and reach, which is often common practice amongst warehouse operatives. Unfortunately one supermarket insists that it is supplied with pallet loads of 12 kg trays stacked ten high, when others are happy with 10.8 kg stacked eight high, this is surprising when we should all be following the same HSE guidance.

#### **5.4 VEGETABLE AND SALAD CROPS: WARWICKSHIRE**

Manor Farm is the headquarters of a large grower (2000 hectares) in a twenty five mile radius, producing mainly Brussels sprouts and salad onions.

The company employs approx. 400 staff (250 part-time) plus between 1000 and 1200 casual workers on a seasonal basis as the harvesting is mainly by hand. However they seek continuity within the labour force so that workers get accustomed to company procedures.

The field work of establishing crops, fertilizing and irrigating is almost totally mechanized, however, there is some semi-automatic transplanting of Brussels sprout plants, and the hand pulling of salad onions is made easier by the use of a tractor mounted under cutter. Although they use twenty five hose reels for irrigating there are also sprinklers on stand pipes with special trailers for moving them and their associated pipes.

Harvesting is mainly by hand (pulling onions, and picking Brussels sprouts and beans), partly to ensure high quality of product, and also because of the limitations of moving large harvesting machines to a number of farms scattered over a twenty five mile radius.

Much of the equipment is maintained and repaired by their own engineers in a well equipped workshop, the engineers do get back injuries, but keep themselves mobile, and avoid any tasks that have caused the problem, until they are better, and use the fork lift truck for heavy work whenever possible. They are due to move into a new building in the near future.

The company has a well established health and safety policy, and they employ professional advisers that help to set up safe systems of work and carry out safety audits. The Farms Director is chairman of a health and safety committee, which meets bi-monthly, and is made up of departmental heads, employee representatives and an external trainer. Training is prescribed depending on the level of activity, e.g. workers pulling salad onions, which involves handling 10 kg crates will receive a "passing on the skills" course, these are conducted by nominated trainers selected from their own staff. The training is delivered in an appropriate language for non-English speaking workers. Tractor drivers and operators of equipment that require training under health and safety regulations receive a course from an external trainer.

The pack house was unavailable on the day of visit, as a supermarket was carrying out its own audit into hygiene and quality assurance. Obviously the company has a good health and safety policy and procedures in place. Risk assessments and monitoring of procedures ensure that manual handling problems are kept under control.

## **5.5 ESTATE MAINTENANCE: CUMBRIA**

Estate maintenance has been covered separately as most farmers and growers will do some of this work themselves, although one farmer in this survey used mainly electric fencing. As the National Trust (NW) does a great deal of estate maintenance, including some for their own tenant farmers, and as I have provided some manual techniques training for them they kindly agreed to help me get a better insight into this aspect of farming. My contact was John, the Upland Project Manager, but when I first met him he was the Countryside Coordinator responsible for the footpath and estate maintenance teams and at that time found himself dealing with numerous accident reports related to manual handling. With the help of their own Health and Safety Advisor a plan was developed to reverse this trend.

The first stage was to carry out risk assessments of the tasks these teams undertake, namely hanging gates, dry stone walling, fencing, hedge laying and cutting, drainage and general work such as shovelling. The second stage was to provide manual handling techniques training.

Difficult tasks included:

- Hanging gates, theirs are usually made of wood and if they are over 2 m in length it is considered a two man job. The main problem is getting them off trailers and aligning them on the hinges.
- Dry stone walling, this involves digging out the footings, placing the largest stones into the footings, and placing through stones into position, and the work encourages people to stoop.
- Placing cam stones (copings) on the top of walls is not a real problem in the Lake District as slates are used, which are thinner and therefore not so heavy.
- Hedge laying calls for working at low level, (some people kneel and use knee pads.)
- Fencing involves digging holes for the strainer posts, driving in the intermediate posts and stapling on the wire. They some times hire a tractor mounted post driver and/or an experienced contractor. A wire dispenser is used whenever possible, especially for barbed wire. John wishes there was a portable version available.
- Shovelling is now carried out at waist height e.g. straight from the trailer, rather than tipping and shovelling from ground level.

The RAs have led to the development of SOPs to suit the various situations that they have to contend with, such as working on slopes. Job rotation is employed as a matter of principle. Other risk reduction measures are discussed in sections 6 and 7.



## 6 EXTENT AND SOURCE OF MANUAL HANDLING PROBLEMS

### 6.1 INTRODUCTION (INJURIES AND THEIR CAUSES)

In talking to farmers and growers during the course of this study, it became evident that there was a difference between actual causes of injuries and what they found arduous, and it was not surprising to learn that most of the people I spoke to had suffered some form of MSD in the past. Some of the comments made about their injuries are referred to in the case studies, table 6.1 summarises these and other comments made during the visits.

**Table 6.1** Comments made on injuries

| Person spoken to   |          | Comment made on injury                            | Suspected cause  |
|--|----------|---|--|
| Geoff  | aged 60+ | Non-specific lower back pain (LBP)                | Picking up a bucket  |
| Peter  | 60+      | LBP   | Not known (n/k)  |
| Wesley   | 54       | Back joint problem<br><br>(several reoccurrences) | Occurred whilst feeding calves<br><br>Whilst throwing tyres on a silage clamp      |
| Matthew  | 27       | LBP   | Plant nursery work   |
| John   | 40       | Surgery on two discs                              | Chopping wood and feeding calves   |
| Evan   | 34       | LBP   | Tug of war and after clipping sheep  |
| Will   | 50       | LBP and Upper limb disorder (ULD)                 | Tractor driving  |
| Jeff   | 38       | Congenital curvature of spine                     | n/a  |
| Roger  | 43       | LBP   | Milking cows at 20 years of age  |
| Two agricultural engineers employed on the farm aged 25 & 45 |          | Several accidents reported                        | Handling steel, gates and tractor wheels, also twisting whilst lifting or reaching |
| Harry  | 49       | LBP 5 years ago                                   | n/k  |
| Arnold   | 60       | Keyhole surgery on his spine, 18 years ago.       | Lifting a wooden barrow whilst mucking out.  |

Although the injuries caused by manual handling of objects and animals were numerous they were mainly historical, some congenital and a few required surgery, however most were non-specific and the problems have passed.

The production manager of the HNS unit felt that by avoiding the use of specialist staff and employing workers to take on a wide range of tasks, manual handling injuries could be reduced. It seems that many tasks undertaken in farming and growing can be repetitive and therefore monotonous and that a change of routine can make the job more interesting. Whilst others believe that specialists develop deft movements that come from practise and experience, this was certainly the case amongst sheep farmers and the growers. Fortunately some people like this type of work and the apple and tomato growers had no difficulty in retaining staff, like wise, the vegetable grower found that the gang master they use tends to get the same workers returning each season. Several people I spoke to merely suffered aches and pains at the end of a hard day's work.

The HR manager of the large poultry unit informed me that, in spite of their efforts, 38% of their reported accidents are due to manual handling and that knee injuries were common amongst the workers in the company's pig units. The tomato grower was concerned about the risk of repetitive strain injuries (RSI) and those dealing with sheep found the seasonal nature of their tasks took some getting used to. The health and safety advisor of the large arable unit was convinced that manual handling techniques training had been a benefit to the engineers. He also hinted that potato grading and bagging may have caused back injuries, yet the farmers of the large mixed unit employ a couple in their seventies to help them with potato grading every year and they do not have any problems. The farmer on the large beef unit said that people working in farming need to be fit. If fitness is a combination of strength, suppleness or flexibility and stamina then what workers do best is what they are used to and it is the unfamiliar tasks or unexpected occurrences that catch them out and cause injuries.

These findings are far from conclusive but tend to reflect those given in the evidence review published by the Faculty of Occupational Medicine in March 2000.\* It appears that many self employed farmers are following the recommendation to return to work as they have little choice in the matter but the larger organisations might also benefit by following the recommendations given.

\* Occupational health guidelines for the management of low back pain at work. Evidence Review and Recommendations

## 6.2 COMMON PROBLEMS AND SOLUTIONS

The common problems expressed were not necessarily the cause of injuries but are mainly the views of the people that took part in the survey. The solutions to specific problems in this section will not be applicable in every situation however most were observed or discussed during the visits. The aim of listing them here is to show how those people that are proactive have managed to make tasks easier and hopefully help others do the same.

The problems are listed under the same headings, and in the same order as used in sections 4 and 5. The solutions are summarised and expressed as a hierarchy of measures, namely:-

- Elimination: Where possible, by the introduction of mechanised operations, the bulk handling of materials, and the introduction of equipment for handling animals.
- Engineering and design: Aspects of which could reduce the risk of injury by improving work layouts, making transportation easier and providing simple handling aids.
- Organisation: Factors that affect the production process in order to improve efficiency.
- Training: Points that can affect handling technique and raise awareness of problems, including the need to assess situations before handling loads.

### 6.2.1 Arable units

Apart from the problems listed below, arable farmers appear to have overcome most of their manual handling difficulties by the use of mechanisation and the introduction of bulk handling systems

Maintenance and repairs carried out on farms

- Use local dealers and/or lease hire
- Use appropriate lifting equipment, power tools etc.
- Some are in the process of reorganizing their steel storage
- Training can raise awareness amongst engineers of their particular problems and help them develop good handling technique

Tractor weights

- Some farmers are using large track laying tractors that do not need additional weights
- New designs are available that can be fitted with the aid of a lifting point or the three point linkage of another tractor. They can also be front or rear mounted
- Conventional weights could be stored on a rack at the same height as the tractor location point rather than storing them on the floor
- In any case good basic handling technique should be used

### Wheel changing

- Specialist tractors with suitable wheels permanently fitted
- Use mechanical wheel handlers
- Suitable storage of wheels is essential
- Give training in the use of simple handling aids and team work

### Sheeting lorries

- Mechanical systems require the load to be level
- The winding handles are not always easy to use
- One farmer used his telescopic loader to lift and pull the sheet over the load
- Avoid working at a height

### Chitting potatoes

- Eliminate chitting by purchasing different varieties or chitted seed
- Use pallet turntables
- A good work layout is essential, and/or job rotation
- Train in stacking methods (place feet either side of the corner of the pallet in order to avoid reaching)

### Grading, bagging and delivery of potatoes

- Move to bulk handling
- A range of good equipment is available, including special lorries for delivery
- Load 30 bags per pallet for delivery, and 40 for wholesale
- Training required, as above

## **6.2.2 Beef units**

Beef farmers had no specific problems but suggested that modern buildings are essential and the equipment needs to be sturdy due to the weight and strength of cattle.

### Dehorning and disbudding

- Use a chemical paste
- Cattle handling crushes of good quality are available
- Animal husbandry in remote areas needs planning
- There appears to be a need for animal handling techniques training

### Calving

- Change to a breed that can calve without assistance
- Use a mechanical aid
- Plan ahead
- Also requires training

### Repair and re-hanging of gates

- Avoid damage in the first place by making sure that gates latch in both open and closed positions
- Avoid gates with diagonal struts, as ear tags get caught and removed by them
- At the construction stage install curbs so that gates are protected during scraping
- Trainees should be made aware of the repeated effort in moving difficult gates

### 6.2.3 Dairy units

Dairy farmers tend to be locked into a particular system linked to the buildings (cow kennels, cubicles etc.) and are not always able to make use of modern equipment. Parlour design is not always easy to change, and can be a confined space with difficult access and egress. One farmer was fortunate in being able to move to a new site with new buildings and a parlour that had light weight clusters and an ergonomic layout. He contracted out the field work, such as silage making, leading straw and muck spreading. This passed the problem on to somebody else, however contractors should have the latest specialist equipment and experienced staff. The herdsmen did not seem to mind the regular routine work of milking.

### Training calves to feed from a bucket

- Train on a teat bucket
- Automatic calf feeders are available
- Use a bottle so that the change of feeding pattern is gradual
- The suggestion of kneeling was dismissed as the animal has to be restrained whilst holding the bucket

### Carrying calves

- Use a barrow or hand truck (although some animals will resist this method)
- A truck with Ackerman steering would make it more manoeuvrable in confined spaces
- Limit the carrying distance
- Another case for animal handling training

### Dealing with downers (cows that cannot get up)

- Loose housing appears to reduce the incidence, whereas the problem is more complex if the cow is in a cubicle
- There is a need for a special type of loader bucket, and one farmer is trying to develop a system of strapping on one of his buckets that will secure and restrain the cow
- Beware of ice and slippery conditions
- Special training required as workers can be kicked by the animal

### Opening and closing gates

- Carried out several times a day and therefore should be hung properly and work well
- Developments such as gates with 'popholes' (a gap for pedestrians), wheels on the end to take the weight of long gates and sturdy wheels on rolling barriers all help.
- Getting the gates, barriers and passageways right can have a considerable effect on the ease of handling animals
- Make trainees aware of the wasted effort that goes into the handling of awkward gates

### Handling 205 ltr Drums of teat dip

- Decant using a pump
- Use a drum handling trolley
- Arrange for delivery to the point of use
- Special techniques exist for handling manually but they require training and practise

### **6.2.4 Mixed units**

Farmers with several different enterprises obviously have the same problems as the specialists and therefore more of them. They do not always have the best equipment and have a wider range of tasks to perform.

#### Hitching trailers with a ball type hitch to ATV's and 4x4 vehicles

- An unavoidable task carried out in a confined space
- The jockey wheel helps but the hitch design could be improved
- One farmer uses a simple extension lever
- The operation requires people to look at what they are doing with their hands and encourages stooping

#### Handling the ramps and decking of livestock trailers

- Purchase latest type of trailer
- New designs have a light weight ramp that is raised by gas cylinders and has aluminium decking
- Find alternative use for old trailer
- Much easier to operate

#### Animal handling (especially sheep)

- Adopt flexible handling system
- Install equipment that suits the range of species
- Move animals towards light and around corners whenever possible
- Training in animal behaviour may be required

### Pulling bands from big bales

- Netting is easier to deal with
- Better if knots are accessed before pulling
- Only pull half the number of bands at once
- When pulling use body weight and legs, and stand with one leg back to maintain balance if the bands give suddenly

### Handling bags of feed made up on the farm

- Raise the hopper to ease bagging off
- Use pallet boxes or cages, hand trucks and trolleys (wheel configuration will effect ease of handling, if there are two fixed wheels at the front and two casters near the operator then body weight and legs assist steering, otherwise upper body strength has to be used)
- Keep the content and weight of bags to what is manageable for the person handling them
- Carrying on the shoulder puts less strain hands and arms, it is easier to breathe and it leaves a hand free to open doors and gates but pressure on the spine, remains and the carrying distance should be limited.

### Fitting loader attachments

- A necessary task
- Devise a storage system that has the hitching pins at knee height or at least place them on a pallet
- Leave big bale spike in the next bale to be used
- Avoid stooping

## 6.2.5 Pig units

Of the three pig units visited the only problem mentioned was the difficulties of moving pigs at the various stages of production. The feeding was usually automatic and waste disposal mechanised. Only one provided bedding as the pigs were brought in for fattening and were kept in loose housing as opposed to buildings with slatted floors. The bedding provided was big bales of straw dropped into the pen with a telescopic loader (TL) and the pigs helped themselves. A fourth pig farmer who has closed his unit to new stock since 1976, he has five boars and uses artificial insemination (AI) to provide new blood lines. The unit is also closed to visitors and I have included some of his ideas even though I was unable to observe them.

### Moving and weighing pigs

- Apparently this is governed by the original building layout
- An open topped handling crate 3 m x 3 m with a swinging door is used by one farmer, the pigs are loaded into it at ground level and a TL is used to move it.
- Planning the layout so that the animals move towards light and / or around corners was mentioned again.
- Some lorry drivers are stockmen and other are not ( training may help)

### Dealing with dead sows

- Avoid manhandling as much as possible
- Use winches and a compact tractor
- Careful planning is required
- Some manual handling to position the sow is unavoidable

### 6.2.6 Poultry Units

Although the industry uses automated feeding and weighing equipment there is still a considerable amount of manual handling, especially when setting up, loading and unloading for transportation, and during egg collection and handling.

#### Turnaround (re- stocking with new birds)

- This cannot be avoided and although the weights involved are reasonable, the frequency is high, and the working environment difficult
- Light weight fan covers would help
- Use of a power drill to raise feeding and drinking lines is easier than hand winching
- Be aware of trip hazards as lighting is poor

#### General handling tasks

- Trays of chicks, hand feeding and weighing of cockerels, collecting dead birds and spreading litter etc. are all routine tasks. There is a greater number of hens and their feeding and weighing is usually automatic
- Use portable corrals and teamwork
- Numbers of birds and / or weight of loads handled are usually controlled by the operator but the maximum is set by the company, for example, three or four 5 kg trays of chicks.
- Operators can handle one tray at low and high level, but three or four at waist height

#### Egg collection

- Use auto-nests
- The provision of bridges over conveyors would reduce trip hazards
- Put warning signs on doors that open out
- Make staff aware of environmental hazards

#### Egg handling

- Tall trolleys that weigh up to 350 kg when loaded have to be moved into a cold store, transported to and moved around the hatchery
- Develop removable push bars, and a tool for pulling the trolleys over uneven surfaces (see handling aids 7.2)
- Change building layout to reduce the distance that the trolleys are moved
- Cover pushing and pulling techniques during training

## Catching

- Use specialist teams or contractors
- Harvesting equipment is available but not always suitable
- One foreman found it easier if he and a colleague corralled the birds near one door, whilst the catchers worked at another
- Catchers need to be young and fit, the work is often carried out in unsociable hours (birds are easiest caught in the dark)

## Work at free range and battery farms

- Feeding is semi- automatic, therefore hoppers need to be topped up, involving low, medium and high level work. The free range unit used auto-nests, but the conveyor was hand operated, and 350 birds are replaced monthly so that turnaround is gradual
- Raise the feed hopper to make bagging off easier, and use trolleys with egg trays for egg collection
- Use a 4x4 vehicle to transfer the bags to hen huts
- Knee pads or a kneeler may ease egg collection if operators would use them

### **6.2.7 Sheep Units**

Farmers that rear sheep appear to suffer most, due to the size and number of animals that are handled, but also because of the number of different tasks that have to be performed, such as dosing, foot trimming and shearing, as well as the routine tasks of feeding and gathering. The main complaint seems to be the constant change of routine, and the requirement for their muscles to become accustomed to each new task.

## Shearing

- Use contractors who have their own equipment and have developed the skill from experience
- There is a good range of gates and equipment available
- It is essential that contractors are assisted, especially if they require catchers
- Farmers could shear their own, but training and experience are required

## Dosing, foot trimming and dipping

- Use showers or jettors instead of dipping
- Turnover crates are a help, but those currently available are not always sturdy enough, or easy enough to use
- A system that gives a good flow is essential, holding pens or paddocks are an advantage, Guillotine gates, gates that rotate 360 degrees and those that can be linked together have proved effective
- Recognise the need for stamina or rest periods

## Bedding

- Allow sheep to forage big bales, and then spread the remainder by hand
- There is equipment available for unwrapping bales
- The layout of buildings will dictate the method used
- Workers must recognise their limits, and only handle manageable loads, or use team work

## Feeding cake (pellets of concentrate)

- Use ATVs and a trailed spreader for field work
- The ball hitches for these trailers could be a better design
- Feeding can be linked to inspection
- Avoid stooping when hitching trailers

## Mineral licks

- Reduce size purchased, replace 80 kg with 40 kg or even 22.5 kg tubs

## Moving ewes and their lambs to pasture

- Position lambing shed near pasture
- A special trailer has been developed for this purpose, but it is not available commercially
- This is a task that needs planning
- Good teamwork is essential

### **6.2.8 Horticultural units**

Horticultural enterprises vary considerably; on the one hand there are large producers of vegetable and salad crops (such as carrots, parsnips and salad onions) that can be harvested in a similar way to arable crops. Some crops need hand picking or cutting, and placing on what is basically a mobile conveyor and packing station. On the other hand tomatoes, cucumbers and pot plants are raised in glass houses or poly tunnels, where the environment is controlled to suit the plants rather than the workers. There is also the production of trees, shrubs and container plants, plus top and bottom fruit.

Fortunately there is considerable scope for automating the processes, although much of the equipment originates from Holland or Belgium, and perhaps growers or not always aware of the existence of such machinery. Of the growers visited, much of the work was carried out manually, for example, hand picking, stacking trays on pallets, pushing and pulling pallet trucks and trolleys.

As some of the operations are common to all growers a number of examples have been selected to show how problems have been tackled, and where improvements could still be made.

#### Glasshouse unit (tomato production)

- Equipment for seeding and laying out automatically is available and would make propagation easier
- Bumble bees were used for pollination, trolleys that ran on the heating pipes made crop husbandry and picking easier, and hand trucks that could be tipped were used for transportation to the packhouse
- Organisation was such that operators could pick and transport, giving a greater variety of work, and the layout in the packhouse gave operators plenty of room to manoeuvre
- Operators need training in stacking trays on pallets without twisting and reaching

#### HNS production

- The only hand work was transplanting, potting on and container site work (laying out and retrieving)
- They are moving towards machines for transferring plugs, and used one of a large range of potting machines available
- The wide range of materials handling equipment made the system of growing, transporting and dispatching well organised
- Staff were multi-skilled to enable job rotation

#### Top fruit (apples)

- Low growing variety of trees has been selected and by using picking buckets with a harness and drop tube, harvesting has been made as easy as possible
- The apples are floated from the pallet boxes, the grading is automatic, and an electric truck is used to handle pallets in and out of the cold store
- During grading prolonged awkward postures are adopted but job rotation eases this problem.
- The layout is such that operators have to take a few steps when stacking trays onto pallets which discourages twisting and reaching

#### Vegetable and salad crop production

- Crop production is mechanised but the harvesting is by hand because the fields are spread over a wide area and to ensure a high quality product
- A conveyor for elevating the bags of sprouts into the pallet boxes on the trailer was provided but the gang members preferred to throw them up to a colleague
- The labour was well organised and monitored
- A structured training programme existed

#### General observations

- Some growers were moving towards bulk handling of peat
- Most were well aware that a good ergonomic layout made business sense
- Watering was often carried out by hand as the nurserymen could judge the amount needed by each group of plants
- Working in a stooped position was common (see the suggestion on a kneeler in 7.2)

### **6.2.9 Estate maintenance**

Estate maintenance is an important part of controlling the movement of animals, security measures and for aesthetic reasons. It involves the manual handling of tools, equipment and materials in order to erect or repair fences, hedge, walls and gates. Some gates are made of wood for looks and other steel to last but both can be heavy and difficult to handle. Repairing part of a fence or dry stone wall can be harder than putting up a new one.

- Use an experienced contractor or electric fencing
- Hire mini diggers, powered barrows, post drivers and wire dispensers
- Organise scaffolding on sloping ground and work from a trailer on tall walls
- Stress the advantages of working on one knee when working at low level, and value of using knee pads

### **6.3 LIMITATIONS**

Changes in buildings and equipment in order to solve manual handling problems would probably not make business sense as the reduction in risk would be disproportionate to the cost involved. Those farmers used in the case studies that were fortunate enough to be able to do this found that their manual handling operations had been minimised. Several participants wanted to improve their facilities in order to make the enterprise viable, and two constructed new buildings themselves. Those that invested in RTFLT's obviously saw them as a benefit, as it was common for these vehicles to be replaced every three years. It is important to have equipment that matches existing buildings and their layout, and the skid-steer loaders have an obvious advantage in older buildings with limited head room, but they lack the versatility of telescopic loaders. Some dairy farmers have buildings (including milking parlours) and equipment that was installed years ago, and these are unlikely to be replaced when they see other dairy farmers giving up milk production.

A major cause of concern was the lack of suitable equipment for handling large numbers of sheep, some farmers thought the equipment available was not sturdy enough for heavy hogs and rams, and although it worked well for a few sheep, it was tiring to use when dealing with large numbers.

The size of the enterprise and the geographical area also limited the justification for investment in sophisticated equipment that was only going to be used for a short period, for example, when propagating tomato plants. When fields are spread over a wide area, the transportation of vegetable harvesting machinery is difficult, as is getting animal handling equipment to the point of use on hill farms. If the lack of funds and opportunity limit the investment in new equipment, then it is important to consider all other risk reduction measures, and there are many examples in section 6 that are cost effective.

Another drawback to finding solutions is peoples' attitude, it was noticeable that one or two of those I spoke to dismissed suggestions without much thought, some were doubtful about the value of training, and many were not aware of how much time is lost through MSDs. There appeared to be a reluctance to confront the person with the

authority to make changes, workers talking to employers, and farmers talking to manufacturers if their equipment has shortcomings.

Farmers and growers face pressures from outsiders, customers (supermarkets) will demand that trays of fruit and vegetables are a particular weight, and stacked at a height which can be difficult for some employees. Contracts are sometimes issued late making the timing of operations difficult, for instance reducing the time available for chitting potatoes. Some farmers and growers are made to feel uncomfortable by pressure groups, and people that live in nearby villages do not always understand farming and the associated movement of animals, materials and equipment. The size of products that are bought in are sometimes larger and heavier than is advisable, but farmers are tempted to buy the larger size in order to save on costs.

Family farmers who do much of the work themselves are reluctant to take time off for minor injuries, as animals still have to be fed, and although friends and family will often help, these injuries are not always diagnosed and treated properly, and could develop into a chronic disorder. In some cases exercise and an early return to work are advocated but even muscle injuries, that repair themselves, need a short period of rest.



## 7 OTHER OBSERVATIONS

### 7.1 RISK ASSESSMENTS

It was never the intention to ask to see the risk assessments that had been carried out, although the subject did come up in discussions and three of the larger organisations gave me examples of what they had done. The approaches taken are described below:-

- 1) A generic assessment of lifting injuries caused by straining, the risk was seen as moderate and the precautions to follow were listed. It was supported by a staff manual.
- 2) An assessment of particular work activities, giving the associated hazards and risks in terms of probability and consequence. The control measures referred to company SOPs that were necessary to eliminate or reduce the risk of injury. The company intends to integrate RAs and SOPs (which will be enhanced with images) in order to make employees more aware of the importance of following safe operating procedures.
- 3) The third model related risk to specific manual handling activities but also referred to other related risk assessments. It listed the physical and health hazards arising and the organisational and physical precautions to be taken.

These models, helpful as they are, do not show why a particular manual handling activity is hazardous and it was an aim of this study to analyse a number of tasks that caused problems. Time prevented this but figure 2 is an example that was carried out on behalf of the National Trust estate team. It shows that by focusing on all aspects of the activity, namely, the task, load, working environment and the capability of those doing the work, it is possible to see what is causing the difficulties. In the example given, the members of the estate team would not team up to carry heavy stones that were difficult to hold, for fear of losing their grip and dropping them. By introducing the use of a strong net they were able to get a secure hold and carry stones in teams of two or four. It also highlighted the need for good judgement when digging holes for the stones or the use of a measuring stick.

Farmers and growers have learnt from experience, hence the ideas that have been described in section 6, but perhaps task analysis would speed up the search for solutions to manual handling tasks that are arduous and time consuming.

| <b>Task</b>   | <b>Comments</b> | <b>Load</b>  | <b>Working environment</b>                             | <b>Individual capability</b>  | <b>Controls</b>   | <b>Action</b>  |
|---|-----------------|--|--|---|---|--|
| FOOTPATH CONSTRUCTION   |                 | Heavy stone and awkward to grip. Up to 30-35kg.    | Always hostile:-<br>Extremes: hot or wet. Dry best.    | Experienced, skilled staff.<br>Normally their technique is good but sometimes unable to use good handling technique as it is difficult to get a good hold and some twisting is unavoidable when shovelling. | Encouraged to work within personal capacity and at own pace.<br>Use a limited range of handling aids.<br>Good PPE; especially boots that are ideal for walking and provide a good grip (footing). | Consider the use of nets.<br>Train new staff in manual handling techniques.<br>Refresher course for experienced staff.   |
| Digging and shovelling in preparation for placing heavy stone.  |                 | Especially when wet or recently excavated (muddy). | Difficult to maintain footing and balance on inclines. |   |   |  |
| Measuring/judging size of hole (important if stone is to fit first time).                                     |                 |  | Trip hazards on rough ground.                          |   |   |  |
| Removing stone from "heli-bag", loaded by same staff so they know what size and weight they are dealing with. |                 |  |  |   |   | Introduce measuring stick.   |
| Manoeuvring stone by:<br>Turning end over end.<br>Sliding into place.   |                 |  |  | They are reluctant to team up on large heavy stones as one of them might lose his hold and drop the stone (the use of a net might help).  |   | Consider rehabilitation policy.<br>NB In light of new evidence see "Occupational Health Guidelines for the Management of low Back Pain at Work" published March 2000 |
| Adjusting position of stone (using lever)   |                 |  |  |   | New staff supervised by experienced staff.  |  |
| Occasionally removing stone in order to reposition it.  |                 |  |  |   |   |  |
| Transporting – initially by helicopter, then as above or barrow for medium distance.                          |                 |  |  | Aware of obvious hazards.   |   |  |

**Figure 2:** National Trust Estate Maintenance.

## 7.2 INNOVATIONS AND HANDLING AIDS

A surprising number of ideas and suggestions emerged as a result of the visits to farms and holdings and there are probably many more that are yet to be discovered. Below is a list of those not mentioned earlier:-

- Using a spanner to turn the power take off (PTO) shaft in order to unwind the web of a potato harvester. Agricultural engineers must be aware of many such problem solvers
- Ergonomic benches for hand potting (the bench has a recess for the person potting up) avoids the need to reach
- A motorised truck used for layering tomato plants and picking the crop
- Trailers with linked axles for moving irrigation pipes. The same design has been applied to small trailers and hand trucks, making them more manoeuvrable (see diagram 1)

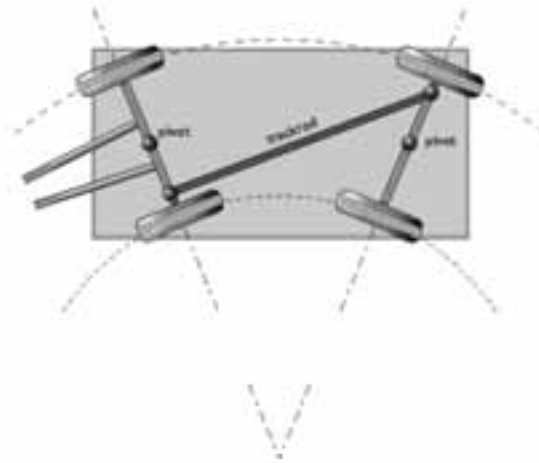


Diagram 1 *Linked axle trailer*

- Many special features on gates, including one that allow them to open on to sloping ground
- A 'J' shaped tool about 80 cms long was used to pull the bottom of tall egg trolleys into the hatching room which had a small lip on the floor, without the aid of this tool the trolleys tended to tip towards the handler
- A device (of Dutch origin) that was used many years ago by workers picking crops grown at ground level enabled them to kneel, rather than work in a constantly stooped position. As the knee joints are not over flexed it is easier for them to stand when they wanted to. It was strapped to the leg rather like a cricket pad. Perhaps there is still a call for such a device today, if we could convince someone to develop it and workers to use them (see diagrams 2, 3 and 4).



Diagram 2 *Stooping*



Diagram 3 *Kneeling*  
(note: use of knee pad)



Diagram 4 *Kneeler*  
(note: reduced flexion of non-kneeling leg)

There are still difficulties that need resolving, a worker was observed holding a 20 kg bag of Brussels spouts on scales at eye level whilst checking its weight, when a tripod would eliminate the stress this action must put on his arm, shoulder, and back. Likewise the wheels of a rolling barrier had collapsed and needed two men to carry it, if it had been supplied with suitable wheels in the first place it would have lasted longer. There is a need for an RTFLT attachment that could be used for dealing with downers and there must be potential for some of these ideas to be developed commercially.

### **7.3 MANUAL HANDLING TECHNIQUES**

Workers were using good technique on many of the routine tasks being performed during the visits, such as turning sheep and stacking trays on pallets. However some of the handling methods being used were not consistent with the principles described in the Institute of Occupational Medicine (IOM) report published in 2003 \* I saw people stooping, reaching, and even balancing on one leg (sometimes referred to as the golfer's lift), when questioned many thought that a deep squat was the correct way to lift.

Some of the tasks required workers to look at what they were doing, picking Brussels spouts for example, this results in a curved spine or stoop, kneeling overcomes this to some extent but some people have difficulty standing up from this position, hence the suggestion that a kneeling device might help.

The IOM report is a useful guide to good practice and the principles describe in the report are related to agricultural work below:-

- Think before lifting (plan the task and prepare for the lift). The positioning of pallets and work layouts (see 6.2.8) will allow workers to get closer to the load.
- Keep the load close (minimise the horizontal distance between the load and the body) by remembering to place a foot either side of the corner of a pallet (see 6.2.1).
- Get a secure hold (handling aids often help) as in the use of nets (see 7.1).
- Moderate flexion of lumbar spine, hips and knees (avoid stooping and squatting) keeping the head up helps.
- Avoid twisting (especially if bending or reaching) move the feet when turning, not the head.
- Move smoothly (rapid acceleration is detrimental) work at a comfortable pace (see table 2).
- Only move manageable loads (know your limits, minimise frequency and carrying distance) for example, purchase smaller mineral lick blocks.
- Put down, then adjust (slide loads into position) as when handling trays of eggs (6.2.6)

\* The principles of good manual handling: Achieving a consensus

## 7.4 TRAINING

Naturally the education and training of those I met varied considerably, for some knowledge and skills had been passed from father to son, others had been to university or agricultural college, and most had received training in manual handling. Several were aware of a local training provider or an instructor that was registered with the National Training Organisation for the land-based sector (LANTRA). It was interesting to hear from some that they could remember being recorded on video and/or being shown how to handle a wide range of objects, as this was the method of training advocated by the European Training and Development Centre for Farming and Rural Life (CEPFAR).

In November 1991 CEPFAR ran a course in the north of England for instructors so that they could disseminate a new approach to the training of agricultural workers in techniques that would help prevent spinal injuries. Further courses were provided in Wales, Scotland and the south of England during 1992- 94. The approach was to instil a behavioural change, coupled with the acquisition of specialist techniques for lifting and handling, which could be transferred to most work situations but also at home and during leisure activities. The main aim was to inform, convince and involve trainees through the use of video to record their existing technique and compare it with their actions at the end of the course.

The content of the proposed course included theory sessions on the principles of safe manual handling and spinal injuries and their causes, plus three practical sessions on the development of techniques that could be applied to a wide range of objects:-

- 7.3 Basic handling techniques to show that good technique can make handling easier
- 7.4 Problem solving applied to heavy and awkward loads, including the use of handling aids and team work
- 7.5 Work-related tasks and loads, work layouts and the assessment of risks

In 1992/93 a college in the north of England ran a series of courses based on this approach for instructors from agricultural colleges and the Agricultural Training Board (ATB), now known as LANTRA. Seventy people attended these courses and many of them are still active today.

The guidance to the Manual Handling Operations Regulations 1992 (as amended) (MHOR) points out that training is one of the risk reduction measures that employers can take and gives a general indication on content and duration. This is not dissimilar to that suggested by CEPFAR, the organisation no longer exists but the approach it advocated is still valid and appreciated by those that receive such training.

A second training course on animal handling was provided by CEPFAR but was not cascaded throughout the industry in quite the same way. If the findings in this study represent the needs of the industry, then perhaps training providers should be considering the development of training programmes that would meet the needs of farmers and growers, namely animal handling or stockmanship and how to prevent RSIs.

## 8 CONCLUSIONS

Of those working in agricultural and horticultural enterprises that took part in this study, many have suffered some form of MSD in the past, a number of which have been serious. Given the wide range of enterprises visited, there is good reason to believe that such a finding is representative of these industries as a whole.

The farmers and growers visited during the study have, and continue to apply the principles of risk reduction embodied in the Manual Handling Operations Regulations 1992 (elimination, engineering control, workplace/task organisation and training). Much of this change has been implemented for reasons of efficiency and productivity as opposed to any direct desire to comply with MHOR. Nevertheless, these changes continue to benefit workers generation upon generation. Whilst gains in efficiency and productivity have been the driving force behind much of the improvements in many repetitive tasks (particularly in agriculture), there remains a significant amount of manual handling in day-to-day work in both horticulture and agriculture.

The study found scope for reducing risk of injury associated with these tasks through new and better designs for manual handling aids, the layout of workplaces, and the organisation of tasks – many of which have been developed by farmers and growers. However, due to the disparate and intermittent nature of the tasks to which they apply, it is unlikely that these potential improvements will be subject to the same drivers that have reduced the risk from repetitive tasks. For solutions such as these to be identified, developed and disseminated, three things need to happen:

- a) In assessing the risks arising from manual handling operation and implementing controls to manage that risk, employers need to focus on all aspects of the activity – the task, the load, the working environment and the capability of those involved.
- b) More needs to be done to capture solutions developed by farmers and growers.
- c) Suppliers and manufacturers need to take greater account of the needs of their customers when designing buildings and equipment and when packaging goods.

**Appendix 1: Task Analysis Sheet**

PREMISES:

TYPE & SIZE of UNIT:

CONTACT NAME:

| TASK | COMMENTS | LOAD | WORKING ENVIRONMENT | INDIVIDUAL CAPABILITY | CONTROLS | LIMITATIONS |
|------|----------|------|---------------------|-----------------------|----------|-------------|
|------|----------|------|---------------------|-----------------------|----------|-------------|

CHECK LISTS RPU REF: 4510/R55.108

| ARABLE              | DIFFICULTIES | CONTROLS / SOLUTIONS |
|---------------------|--------------|----------------------|
| Wheel changing      |              |                      |
| Front weights       |              |                      |
| Fuelling            |              |                      |
| Hitching            |              |                      |
| Bags of seed        |              |                      |
| Sorting potatoes    |              |                      |
| Bagging/Palletizing |              |                      |
| Baler twine/wrap    |              |                      |
| Workshop repairs    |              |                      |
| Estate maintenance  |              |                      |
| Fertilizer          |              |                      |
| Chemicals           |              |                      |
| OTHERS :-           |              |                      |

## LIVESTOCK PRODUCTION

Silage

Milling

Mixing

Feeding

Barrows

Buckets

Milking

Bedding

Mineral licks

Mucking out

Chemicals

Fertilizer

Gates

Hedging

Fencing

Calving / Lambing

Casting / Shearing

Foot trimming

OTHERS:-

NURSERIES (glasshouse, container sites, trees plus fruit & veg.production)

Propagation

Potting on

Container site

Transport

Transplanting

Crop husbandry

Irrigation

Feeding

Spraying

Undercutting

Harvesting

Grading

Packing

Dispatch

**Appendix 2:** Farmers and growers that took part:

Wesley, Jean and Matthew Abbey  
David Craven  
Gareth Davies  
Paul Rosair & colleagues  
John Atkinson & Samantha North  
Nicholas Dunsby  
Geoff & Peter Goodwill  
John Marsey  
Robert & Fiona Campbell  
Oliver Quarton  
Chris & Janet Harvey  
Mark Hindley & Thomas  
Robert Thornton  
Bob Shedden & colleagues  
Derek Wilkinson  
Nick Whitaker  
Mike Glossop & Harry Dodds  
Arnold Lancaster  
David Cooper  
Jackie McHale, Stephen Hendrie & Gwilym Owen





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