Manual Handling Injury and Back Problems in the Agricultural Sector

by

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Abstract

This report details a study carried out to assess manual handling injury and back pain in the agricultural sector. The report aims to investigate the occurrence of manual handling injury and back pain, determine its severity, investigate farmer awareness of manual handling risks and provide recommendations based on the information gathered.

Previous literature relating to manual handling injury and back pain is very limited and mainly confined to America with some research also carried out in Australia, Switzerland and Holland. Many of the studies were conducted to investigate manual handling injury, back pain and musculoskeletal disorders among workers in different sectors to make comparisons. The findings of this research are compared and contrasted to these studies.

The methodology employed to obtain information on which the findings are based consists of a literature review followed by a postal survey of farmers in county Roscommon. The results of the survey are illustrated graphically, while a process of qualitative data analysis is used to draw out major themes from the responses.

The main findings were that 65% of respondents reported to have been injured due to manual handling. 62% of respondents reported to have suffered from back pain with 20% saying they experienced it within 4 weeks and 55% within 12 months prior to the survey. 65% of respondents reported the pain to be 3-5 with 1 being an ache and 5 being severe. 55% of respondents thought the pain to be so severe that medical treatment was sought. Other general themes are addressed in this report.

The conclusion of this study outlines what the author believes to be the requirements for future interventions, and hopes that the findings and recommendations of this study are of some benefit to the many stakeholders involved.

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List of abbreviations

CAP	Common Agricultural policy
CSO	Central Statistics Office
DAF	Department of agriculture and food
EHS	Environmental Health And Safety
EPA	Environmental Protection agency
Fig	Figure
Frs	Farm Relief Services
FTMTA	Farm Tractor and Machinery association
Ha	Hectare
HAS	Health and safety Authority
HSE	Health and safety Executive
HSENI	Health and Safety Executive Northern Ireland
IFA	Irish farmers Association
NISO	National Irish Safety Organisation
No.	Number
REPS	Rural Environmental Protection Scheme

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Table 2.1 The red flags of lower back pain

1. Introduction

For many years, farming has been rated one of the most dangerous occupations in Ireland (HSA, 2005). A considerable number of adverse health conditions, including manual handling injuries and musculoskeletal disorders, are linked to agricultural work. Many risk factors associated with the development of manual handling injuries are commonplace in agricultural tasks.

Occupational risk factors include static positioning, forward bending, heavy lifting and carrying, kneeling, risk of trips and falls on slippery and uneven walkways; risk of accidents caused by the sudden unpredictable actions of livestock; and exposure to whole-body vibration (WBV) from farm vehicles and hand-transmitted vibration (HTV) from chain saws and powered hand-tools.

The rigorous nature of farm work exposes workers to a number of risk factors that have been associated with manual handling injuries and musculoskeletal disorders. Heavy lifting, working in awkward positions for a prolonged period of time, and poorly designed tools and implements take a toll on both farmers and farm workers and make musculoskeletal conditions the most commonly reported health problem (NIOSH, 2000). Harvesting tasks are stressful to the upper extremities due to the rapid, repetitive motions and awkward postures. Material handling activities that are frequently performed include: loading hay, carrying feed, shovelling manure or carrying bags to name a few.

Unfortunately, there has been limited application of research related to manual handling injuries and back pain in agriculture although many farmers frequently report musculoskeletal signs and symptoms (Myers, 1995).

The industrialisation of agriculture has introduced new equipment with little attention paid to ergonomic design. Competition to reduce margins and the associated increased work demands has also increased farmer's exposure to risk factors through the need for faster working pace and the length of time spent working. Heavy lifting was the most common exposure of farmers in the USA, while repetitive motions were fourth (Mazza, 1997).

To date health care providers and safety professionals have given very little attention to musculoskeletal disorders and manual handling in agriculture. This may have occurred due to the assumption that musculoskeletal disorders are an unavoidable result of farm labour (Fenske and Simcox, 2000).

Manual handling and MSD's can be minimised or in some tasks entirely prevented with the appropriate interventions. These may include design of equipment, improved work processes and increased awareness of manual handling injuries and associated risk factors. In forestry and construction occupations, which are similar to agriculture due to the heavy nature of work and variability of environment and tasks, such changes have had a favourable affect on manual handling problems (Levy and Wegman, 2000).

2. Literature Review

2.1 Physiological reasons for manual handling and musculoskeletal disorders

Mechanical degradation of body tissue may occur due to exposure over time from mechanical stresses that are repetitive, prolonged or forceful. The internal tolerance of body tissues to withstand loading is multidimensional, and a specific threshold may not be identifiable, but rather should be viewed as the capacity of tissues to resist mechanical strain or fatigue (Sesto, 2002). The probability of injury increases when loads exceed the physiological range (Whiting and Zernicke. 1998).

In the following paragraphs common manual handling injuries and musculoskeletal disorders are named and discussed. The risk factors associated with the occurrence of those mentioned are common to many tasks carried out by farmers.

2.1.1 Disorders of major components of the musculoskeletal system

Soft tissue injury triggers a complex series of events involving an inflammatory response, which marks the first phase of the healing process, followed by a proliferative stage, and finally, a remodelling stage. Progression through these phases without complication typically requires a temporary reduction in loading, followed by a gradual increase in loading to stimulate healing and tissue remodelling (Sesto 2002).

Skeletal muscle

The initial event in muscle injury is believed to be mechanical in nature (Armstrong, 1990). The mechanical changes occur when the sacromere, which is located within a muscle fibre, is stretched to a length that prevents the thick and thin filaments from overlapping. This may result in damage to the sarcolemma (Armstrong, 1990).

Within a muscle fiber, sarcomeres may have different lengths (Lieber and Baskin, 1983). During contraction, non-uniform lengthening of the sarcomeres can occur which causes some sarcomeres to be overstretched whereas other sarcomeres are not (Lieber and Baskin, 1983). Therefore, the amount of muscle elongation or displacement that occurs during lengthening contractions may have considerable impact on structural changes in the muscle causing sprains or strains (Whiting and Zernicke, 1998).

Tendon

As the agents responsible for force transfer from skeletal muscle to bone, tendons provide a critical link in the musculoskeletal system (Whiting and Zernicke, 1998). Tendon disorders can be classified based on the anatomy of the tendon and its surrounding tissues. The term tendinosis is often used to refer to repeated loading and is believed to be due to microtears in the tendon (Whiting and Zernicke, 1998). During aging, degenerative changes and microruptures are found.

Nerve

The primary mechanism of injury to the nerve is by entrapment or trauma (Whiting and Zernicke, 1998). The vascular system, which is responsible for providing the energy, needs for peripheral nerves, can be negatively affected when oedema forms in the endoneurial space (Lundborg and Dahlin, 1996). Vibration exposure that occurs when working with handheld vibrating tools or machinery can negatively affect peripheral nerves. Frequently referred to as hand arm vibration syndrome (HAVS). Fibrosis has been observed in the fingertips of individuals working with vibrating handheld tools (Sesto, 2002).

Ligament

Injury to a ligament termed a ligamentous sprain may compromise a ligaments stabilizing ability and impair its ability to control joint movements. The severity of the sprain can be

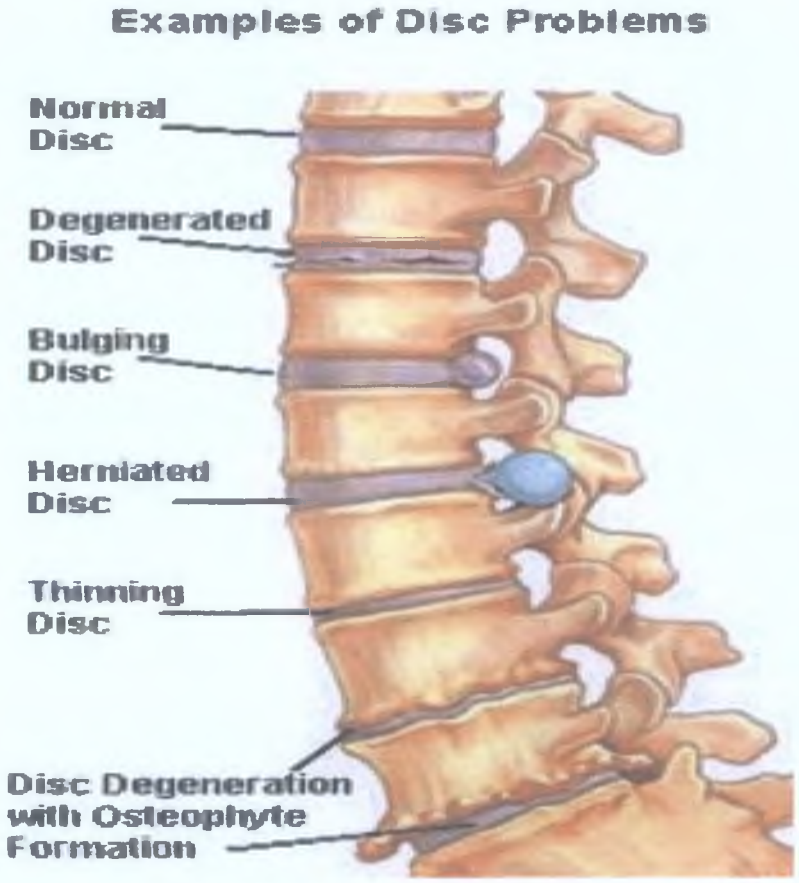
mild, moderate or severe with the latter complete ligament tearing only happening in a minority of cases (Whiting and Zernicke. 1998).

Bone

The injury most commonly associated with bone is fracture or dislocation. Fractures occur when applied load exceeds the bones ability to withstand the force (Whiting and Zernicke. 1998).

2.1.2 Musculoskeletal disorders and manual handling injuries affecting the back.

Figure 2.1



http://www.spineuniverse.com/

Low back pain

The human back was not designed to be a lifting device. Viewed from an engineering standpoint, the back is a horrible design for lifting tasks. When a person uses the back muscles to lift they are using those near the base of the spine. In this instance the spine may be viewed as a lever with a short power arm and a long resistance arm. In the majority of epidemiologic studies, the specific causes of back pain (e.g. sprains and strains, disc herniation, facet abnormalities) are not identified and categories are typically grouped together (Sesto, 2002).

Spinal discs degenerate with age but the independent contribution of physical stress to degeneration is currently unknown. This is due to inherent variability among individuals, and because of aging, this typically corresponds to lengthened exposure to cumulative trauma (Sesto, 2002).

Low back pain is a leading cause of occupational injury and disability in industrialized countries (Johanning, 2000). Risk factors for LBP include heavy lifting and forceful movements, whole body vibration, awkward body postures including static work, bending and twisting, low job control and satisfaction, and monotonous workloads (www.cdc.gov/). A number of nonoccupational contributors have also been described, including age, gender, genetics/family history, body weight/height, fitness level and smoking.

Disc degeneration

One of the most common disorders in the lower spine is disc degeneration, or osteoarthritis in the spine. The spine is made up of bones, or vertebra, and softer, gel-like discs. As the body ages, the discs in the spine dehydrate, or dry out, and lose their ability to act as shock absorbers. The bones and ligaments that make up the spine also become less pliable and thicken. Degenerative discs also demonstrate a reduced ability to

attenuate shock. The discs can then begin to pinch and put pressure on the nearby nerve roots or spinal cord. Degeneration is however accelerated when there is an excessive force applied to the spine like lifting heavy objects (Norris, 2000).

Herniated disc

In this injury, the tear in the annulus potion of the intervertebral disc is so bad that part of the nucleus pulposus squeezes out of the centre of the disc. The annulus can tear or rupture anywhere around the disc. If it tears on the side next to the spinal canal, when the nucleus pulposus squeezes out, it can press against the spinal nerves. Pressure against the nerve root from a herniated disc can cause pain, numbness, and weakness along the nerve (Norris, 2000). An example of where this may occur may be where a farmer is forced to bend down and grab a calf to lift him. Damage to the annulus of the disc (herniation) appears to be associated with fully flexing the spine for a repeated or prolonged period of time (Mc Gill, 2002).

Sciatica

Fig 2.2 Sciatic nerve exiting at base of spine and radiating down both legs.

(www.spineuniversity.ie)

Excessive tension in a nerve is the cause of sciatica as shown in figure 2.4. A normally functioning nerve root will slide up to ½ an inch but if it becomes impinged this movement stops and the nerve is stretched during certain postures. This stretching or compression can cause pain in the lower back, which may radiate down one or both legs (Mc Gill, 2002).

Sacroiliac joint inflammation

The sacrum of the spine is attached to each ileum of the pelvis. These joints are called sacroiliac joints or "SI joints." Each joint is encased and strengthened by strong bands of connective tissue called ligaments. When these ligaments become damaged or worn by excessive use, they allow the joint to have excessive motion. This excessive motion inflames and disrupts the joint causing pain, resulting in sacroiliac joint syndrome (Norris, 2000).

Arthritis pain

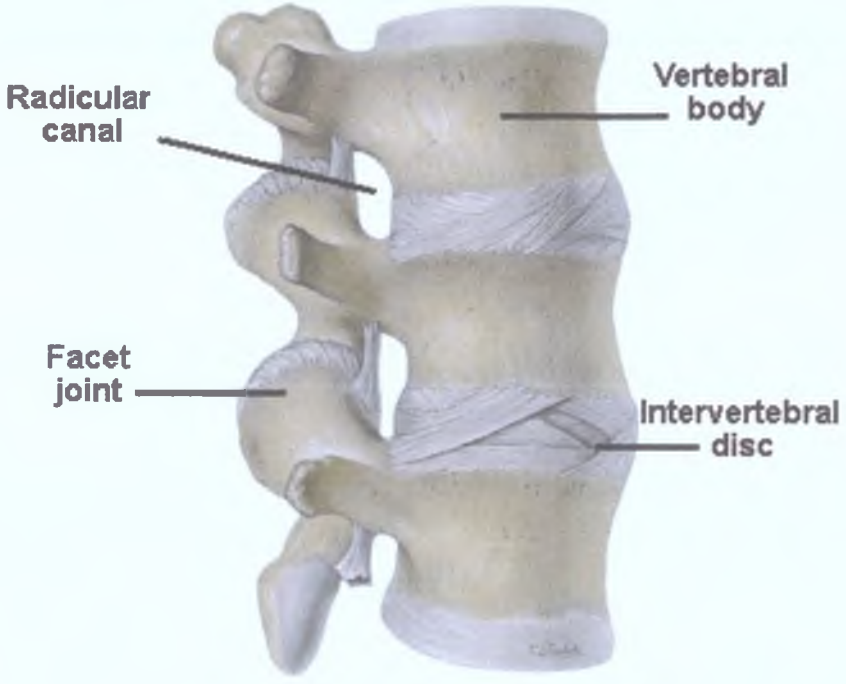
The term arthritis means inflammation of the joints. Arthritis of the spine usually refers to a condition in which there is inflammation of the facet joints between the vertebrae. There are two types of arthritis: systemic inflammatory arthritis and wear-and-tear arthritis. A systemic type of arthritis is a disease process that affects all the joints of the body such as rheumatoid arthritis (Whiting, Zernicke, 1998).

Many arthritis-type diseases affect the connective tissues of the body. All of these diseases cause inflammation of the joint tissues and destruction of the joints. Wear-and-tear arthritis, or osteoarthritis, can result from many things. It can come from a single injury that damages the joint. It can also result from a lifetime of overuse of different joints that damage the joint a little bit at a time (Whiting, Zernicke, 1998).

Osteoarthritis is caused by a permanent breakdown of the articular cartilage inside the affected joint leading to bone on bone contact. In advanced osteoarthritis reactive bony overgrowths or osteophytes form which result in restricted joint motion (Sanders, 2004). Pain due to arthritis is not confined to the back as it can affect joints in any part of the body.

Facet joint syndrome

Figure 2.3 Diagram of spine showing the facet joint



(www.thebackpage.net/facet_joint).

Facet joint degeneration, or osteoarthritis, can be caused by a combination of aging, pressure overload of the facet joints and injury (Norris, 2000). Pressure overload on the facet joints is usually caused by degeneration of the intervertebral disc. As the discs degenerate, they wear down and begin to collapse. This narrows the space between each pair of vertebrae. This narrowing of the space between vertebrae affects the way the facet joints line up. When this occurs, it places too much pressure on the articular cartilage surface of the facet joint. The excessive pressure leads to damage of the articular surface, and eventually the cartilage begins to wear away (Norris, 2000).

When facet joint arthritis gets bad enough, the cartilage and fluid that lubricate the facet joints are eventually destroyed as well, leaving bone rubbing on bone. Bone spurs begin to form around the facet joints. When bone spurs develop, they can take up space in the foramen (the opening between vertebrae where nerve roots exit the spine) and press into

nerve roots. As the bone spurs begin to grow larger, they can eventually extend into the spinal canal itself. This leads to narrowing of the spinal canal (spinal stenosis) leading to nerve signal disruption numbness tingling and pain. (Kaplansky, 2000).

Pinched nerve (Radiculopathy).

Radiculopathy is the medical term used to describe a "pinched nerve" in the spine. A radiculopathy occurs when a nerve is irritated by something that is either rubbing on the nerve or pressing on the nerve. In some cases, such as a herniated (or ruptured) disc, there may also be a chemical reaction irritating the nerve. Chemicals released from the inside of the disc can irritate nerve tissue, causing pain and inflammation of the nerve. First, there is numbness in the area where the nerve usually provides sensation, or feeling. For example, if the nerve usually ends in the side of the foot and supplies sensation to that area, it will have decreased feeling and often pain (Norris, 2000).
While the irritation or pressure on the nerve may be in the back, the brain thinks the pain is coming from the foot. In addition, the muscles that the nerve usually controls will not work right for example, bladder control or sexual functions, this disorder is called Claudia equine syndrome. Things that can cause a radiculopathy include herniated discs, bone spurs, tumours that are growing into the nerves and fractures that put pressure on the nerves (Norris, 2000).

Discogenic pain

Discogenic pain is a term back specialists use when referring to pain caused by a damaged intervertebral disc. The damage may be internal disc disruption, annular tears, and contained and uncontained disc herniations that result in back pain without sciatica (Kaplansky, 2000.)

Segmental instability of the spine

Each spinal segment is like a well-tuned part of a machine. All of the parts should work together to allow weight bearing, movement and support. A spinal segment is composed of two vertebrae attached together by ligaments, with a soft disc separating them. The facet joints fit between the two vertebrae, allowing for movement, and the foramen between the vertebrae allow space for the nerve roots to travel freely from the spinal cord to the body. When one segment deteriorates to the point of instability, it can lead to localised pain and difficulties (Norris, 2000).

Segmental instability occurs when there is too much movement between two vertebrae. The excess movement of the vertebrae can cause pinching or irritation of nerve roots. It can also cause too much pressure on the facet joints, leading to inflammation of facet joints. It also may cause muscle spasms as the paraspinal muscles try to stop the spinal segment from moving too much. The instability eventually results in faster degeneration of the spine in this area. As the disc continues to degenerate, the facet joints become arthritic, bone spurs form around the joints, and the segmental instability gets worse. This cycle continues (Norris, 2000).

Table 2.1 The red flags of lower back pain

Possible condition	History	Physical examination
Fracture	Major trauma Major trauma older patient	Intense tenderness
Tumour	Age <15 or >50 yr Known cancer Unexplained weight loss Night pain	
Infection	Recent fever or chills Recent bacterial infection (UTI) Intravenous drug use Immune suppression Unrelenting pain	Intense tenderness Fever
Caudia Equina Syndrome	Saddle numbness Urinary retention incontinence Severe progressive neurologic deficit in legs	Weak anal sphincter Major motor weakness

(Levy and Wegman, 2002)

2.2 Risk factors associated with manual handling injuries and MSD's

The high incidence of manual handling injuries and back injury may be due to the prevalence of risk factors associated with manual handling injury in agriculture.

2.2.1 Occupational Physical Risk Factors

Numerous studies have reported an association between certain risk factors and manual handling and musculoskeletal disorders. The seven risk factors recognised by the

Occupational Safety and Health Administration (OSHA), National Institute for Occuppational Safety and Health (NIOSH) and most researchers are the following

1. Repetition

Excessive contractions of muscles can cause corresponding tendons to stretch, compressing the microstructures of the tendon, which causes inflammation.

2. Force

One of the major determinants of the level of mechanical stress is the force of the mechanical contractions. For example a forceful pinch is much more stressful than a pinch that is not very forceful.

3. Awkward postures

The amount of force that can be produced by a muscle varies with the posture of the joint.

4. Static postures

Work performed in static postures that require prolonged low level muscle contractions of the muscle. Sustained static contractions can lead to increases in intramuscular pressure, which in turn may impair blood, flow to cells within the muscle. (Levy and Wegman, 2002)

5. Duration of exposure

Duration refers to the length of time each task is performed. It is generally accepted that many types of MSD'S and manual handling injuries are cumulative in nature. Therefore when duration time increases the risk of injury increases.

6. Vibration

Exposure to hand arm vibration or whole body vibration results from the use of power tools or machinery. It has long been known to have an effect on the blood vessels, muscles and nerves. It can lead to the constriction of blood vessels and the development

of numbness and inflammation of the tissues. The finding that certain vibration patterns make the muscle contract leading to fatigue further complicates this situation even though the force required to operate the machine is small.

7. Mechanical stress

In some tasks mechanical stresses can be placed on the tendons and nerves in the upper limbs due to contact with sharp objects. For example working with the wrists resting on a pointed surface may generate symptoms in the area innervated by that nerve. Prolonged pressure may damage the nerve.

(Sanders, 2004).

2.2.2 Psychosocial risk factors

Psychosocial factors may be important in the development of musculoskeletal disorders. Stress is a significant risk factor for musculoskeletal disorders (Whiting, 1998). The workplace hazards and risk factors associated with MSD's have a high degree of overlap with those identified as determinants of work-related stress.

Job stressors such as workload, lack of job control, can produce stress responses that increase the potential for manual handling injury. (www.nohsc.gov.au). Specific work related psychosocial factors associated with low back disorders includes rapid work pace, monotonous work, low job satisfaction, low decision latitude, and job stress. High job demands and high job stress is common among farmers and these are also commonly associated with the occurrence of upper extremity disorders. An example where individuals try to cope with stress full demands, with behaviours that may detrimental to their health may be where an individual because of high work loads or deadlines foregoes rest breaks in order to cope. It is important to remember that this is information is generalized to the agricultural population from other industrial sectors. (NIOSH, 2003)

2.2.3 Non occupational risk factors

Nonoccupational factors also increase risk of manual handling injury. Factors include pre-existing rheumatologic disease, history of musculoskeletal disorder, body mass index, pregnancy, diabetes, renal dialysis, and, thyroid disease. As a result, prevention of occupational musculoskeletal disorders cannot be based upon the application of simple exposure limits, as is done for many chemical exposures (Mani and Gerr, 2000)

2.3 Manual handling injury and MSD's

A quarter to a third of all reported accidents, are due to faulty manual handling practices. The costs associated with these accidents, both in human and economic terms, are enormous due mainly to the chronic nature of the disability (HSA, 2005).

Magee (2002) found in a social study of farmers and farm families in Northern Ireland that 40% of the interviewees reported that they had experienced back pain during the previous 12 months. The prevalence rate was lowest among those aged 35 to 64 at 28% and highest for those aged under 34 at 32% and those aged 65 or over at 40%. The most common health difficulties reported to be caused or aggravated by work were back pain, reported by 7% of the farmers and farm workers. Next most common was other bone, joint and muscle problems and stress, depression or anxiety, each identified by 5% of those interviewed.

Numerous studies have demonstrated a relationship between certain jobs and certain risk factors which are associated with increased risk of developing a MSD and manual handling injuries NIOSH, (1997*a*) however the majority of studies investigating manual handling injuries and musculoskeletal disorders are completed in environments other than agriculture.

Bobick and Myers, (1994) investigated agriculture related strains and sprains in the USA and found that injuries to the back and extremities were quite common. Back pain and pain in the shoulders, arms and hands are the most common symptoms reported by farmers (NIOSH, 2001 *a*).

Gustafsson, (1994) investigated the presence of musculoskeletal symptoms among Swedish dairy farmers. Eighty-two percent of males and eight six percent of females reported musculoskeletal symptoms. Dairy farmers reported frequent symptoms in the shoulders, elbows, lower back, hips and knees, female dairy farmers reported severe hand and wrist problems. As compared to women, men reported more back and knee problems. This may be due to the fact that the male would be more likely to carry out heavy lifting. Women reported more symptoms in the neck, upper back and upper extremities than men. An explanation of this may be that the women would be more likely to conduct tasks that require more static upper body movement like feeding and cleaning.

In a follow up study by Pinzke (2002), it was found that, 83% of male and 90% of female dairy farmers reported some kind of symptoms in the musculoskeletal system during the 12 months prior to the 2002 questionnaire. These higher values may be due to increased awareness of manual handling injuries after taking part in the previous study, which lead to a more informed and honest report in the follow up study. This shows the value of providing information and raising awareness. The respondents were able to identify problems and the results of the study reflected this. The highest significant changes were an increase of symptoms in the shoulder, neck and in the wrists/hands. The milkers reported most often, incidental as well as persistent symptoms in the shoulders. The opinion among most of the farmers in the study, regardless of age or sex, was that silage handling and the milking procedure were the most strenuous work operations.
This is similar to the findings by Hildebrandt (1995), in which, 75% of farm workers in the USA reported experiencing musculoskeletal symptoms during the previous 12 months.

Lower and Tong, (1996) investigated back problems among Australian dairy farmers and found two thirds reported they were experiencing back troubles. Also half of these farmers said that they had been suffering back trouble for the previous ten years or more.

Leigh and Fries, (1992) reported farming was the occupation most often associated with disability in females and the second most often in males. Schenker, (1996) also found an increased risk of arthritis among farmers when compared to individuals in other occupations. In a study by Holberg, (2002) it was found that Finnish farmers have more neck and shoulder problems than non farmers. Farmers had higher prevalence rates of hand and forearm symptoms, low back problems, and hip problems than did non-farmers living in the same rural areas. The main reason for this may be due to the prevalence of manual handling risk factors when carrying out many agricultural tasks. Hence, the benefit of improved manual handling on farms is important.

Croft et al, (1992) reported farmers who had farmed for more than 10 years had eight times greater risk of developing hip osteoarthritis as compared to controls. Several risk factors that may contribute to the development of hip osteoarthritis, such as heavy lifting, stress on the hip from walking over uneven, rough ground and exposure to whole body vibration are common to agricultural tasks (www.hse.gov.uk).

Low-back pain

Given the physical ('back-breaking') demands of farm work, it might be expected that LBP would be a particular risk for farmers and there is some epidemiological evidence to support this. In community surveys from the USA Leigh and Sheetz (1989), Belgium Skovron, et al, (1994) and Finland Leino-Arjas, et al, (1998), simple LBP was more prevalent among farm workers than white-collar referents, the risk being comparable to that of blue-collar workers.

Less evidence is available on the severity of LBP in farmers and the risk of disablement. According to Leino-Arjas, et al, (1998), whatever its origin, the impact of LBP on ability to execute farming duties may, nonetheless, be considerable. Thus, there is an imperative to help farmers by reducing the physical demands of their work.

Low-back pain and tractor driving

When compared with other agricultural workers in Holland, tractor drivers experienced more recurrent LBP and sciatica and had a higher incidence of prolonged sickness absence ascribed to back disorders (Boshuizen et al, 1990).
There is a substantial body of evidence to suggest that exposure to WBV at the doses likely to be encountered by farmers driving tractors is associated with LBP (Bovenzi and Hulshof 1999).

Rheumatoid arthritis

In a cross-sectional survey from Sweden Lundberg et al, (1994) found farmers to have a 30% greater risk of developing RA than other workers.

One very important point is that farmers may be less likely to report symptoms until they reach a level that interferes with their ability to perform their jobs and when this point is reached many farmers who develop problems may leave farming for a different career or retire and this information is not been gathered at the moment.

While these studies provide interesting information it is however specific to countries other than Ireland. Manual handling injuries and musculoskeletal disorders need to be investigated under Irish conditions to allow for an informed assessment of their severity and to allow for investigation of areas in urgent need of attention.

Studies have been published that investigated whether individuals in agricultural occupations were, over the long term, more likely to suffer work-related disability, retire early, or change the type of work they did than individuals in other occupations.

Costs of manual handling injuries

Unknown personal costs, especially those following a serious injury, relate to the loss of ability to participate in previous activities (HSA, 2004 a). Apart from earnings-related loss, manual handling injuries often incur personal costs such as pain and discomfort that may lead to lower morale and loss of skills specific to the farm if the farmer is forced to give up farming for a while. Financial costs may be costs of treatment, finding and training a replacement along with productivity losses due to changed management.

2.3 Legal requirements regarding manual handling

Under part VI of the Safety, Health and Welfare at Work (General Application) Regulations, 1993, manual handling of loads is defined as any transporting or supporting of a load by one or more employees, and includes lifting, putting down, pushing, pulling carrying or moving a load, which by reason of its characteristics or unfavourable ergonomic conditions, involves risk, particularly of back injury.

Part VI of the Safety Health and Welfare at Work (General Application) Regulations, 1993, was introduced to reduce the large incidence of injury and ill health arising from the manual handling of loads at work. The basic principle enshrined in this part of the Regulations is that where manual handling, manipulation, or lifting, etc., of loads with an inherent risk of injury (especially back injury), the employer must take measures to avoid the need for such manual handling where possible. Where this is not achievable, mechanical aids and appropriate organisational methods should be used.

Where manual handling is unavoidable, the employer (a farmer as a self employed person is legally seen as his own employee) must do a risk assessment of any manual handling operation, which involves a risk of injury, particularly back injury. Designers, manufacturers, importers and suppliers of plant and hazardous substances and designers and constructors of buildings or structures, also have duties of care they must fulfil to comply with the legal requirements of the Act. Failure to do this constitutes a breach of statutory duty (www.nifast.ie).
The main structure of the regulations can be viewed in appendix 2

2.5 Reporting Manual handling injuries and MSD's

2.5.1 Limitations of current reporting systems

The annual report compiled by the HSA for 2003 states that the agriculture sector reported very few accidents, reflecting the poor compliance of many self-employed persons with accident reporting regulations (HSA, 2003). This position is not likely to change in the near future as the requirement for a safety statement on all farms will be withdrawn on September 1st 2005 with the introduction of the Safety, Health and Welfare at Work Act 2005, which will replace the 1989 Act.

In the new Act the Minister has moved to reduce the onus on small business and the farming sector by providing that an employer with three or less employees can meet the Safety Statement requirement by adhering to a special Code of Practice to be developed by the Health and Safety Authority for a particular industry or sector (HSA, 2005 *b*). This means that the vast majority of Irish farms no longer have a regulatory obligation to hold a safety statement on their farms. The impact of these changes will not be specific to agriculture but the fact that there was no objection to this from farmer representative bodies is a very obvious indication of the poor awareness and importance placed on health and safety in the Irish agricultural sector. The safety statement gives the farmer a chance to assess his or her farm to identify hazards and determine the associated risk, which allows for the development of controls to remove or reduce the risk of injury, ill health or death.
It also gives the farmer a chance to become aware of his or her regulatory obligations one of which is injury reporting. This new strategy must provide information and increase injury reporting, as information is the key to success.

Poor reporting complicates any effort to develop a campaign to reduce manual handling injuries among farmers. Without sufficient information on injury rates, types of injuries, causes of injuries, risk factors associated with certain tasks and procedures used by farmers to reduce the risk of injuries the success of any campaign may lack the thoroughness to bring about change.

Given the limitations in the current reporting systems, determining the extent of manual handling problems in Irish agriculture relative to other industries is difficult and in urgent need of research. Manual handling and musculoskeletal disorders are very poorly reported in agriculture (HSA, 2005 *a*).

2.5.2 Reported Irish non fatal injuries 2004

The Health and safety Authority implemented a new scheme for the reporting of workplace injuries in June 2004. Workplace injuries that require an absence of more than 3 days from work or where a non-worker requires medical treatment must be reported to the Authority. The authority reported that manual handling (lifting or carrying, pushing or pulling, twisting or turning of body) accounted for 31.3% of reported non-fatal injuries in all sectors (HSA, 2005 *a*). Due to under reporting the contribution agriculture has made to this 31.3% is minimal. One can make the assumption that the contribution of reports of non-fatal injuries from agriculture would be minimal not because of low levels of injury but because of low levels of reporting.

Figure 2.4

Distribution of farmers with longstanding Health Problems by Type

Type	Nos.	%
Back Problem	1,900	21.0
Heart / Blood Pressure	1,900	21.0
Arms / Legs /Feet	1,400	15.0
Respiratory	1,300	14.0
Diabetes	600	6.0
Mental Problems	500	5.0
Stomach / Liver / Kidney	400	4.5
Eyesight	300	3.0
Other	1,000	10.5
Total	**9,300**	**100**

Source: CSO, Quarterly Household Survey 2002

Figure 2.4 shows back problems and arms/ legs/ and feet account for 36% of the total longstanding health problems affecting farmers. Manual handling has an impact on

both of these areas. This clearly indicates that these areas should be the main focus of attention for safety training and safety campaigns.

Fig 2.5 Distribution of farming related illness by type

Illness Type	%
Chronic Back Pain	49
Respiratory/Lung Problems	35
Diseases from Animals	8
Other	8
Total	**100**

Source: Teagasc National Farm Survey

(http://www.hsa.ie)

Fig 2.5 shows that, of the illnesses identified, almost half (49%) were associated with chronic back pain. This emphasizes the point that farmers are very venerable to musculoskeletal problems. Chronic back pain is a very disabling disorder.

2.6 Ergonomics of agricultural tasks

Ergonomics, the study of humans at work, seeks to understand the complex relationships among people, machines, technology, tools, job demands, tasks and work methods. All work, regardless of its type or nature, places both physical and mental stresses on the worker.

A goal of ergonomics is to design facilities, furniture, equipment, tools, work processes, and job demands to be compatible with human capabilities and limitations (Whiting and Zernicke. 1998).

In agriculture this is an extremely important concept. While agricultural work, in general, is a high risk area for manual handling injuries and for musculoskeletal disorders, farming is diverse and the risks vary depending on the type of work done. Although similar hazards may exist for different agricultural groups, such as exposure to material handling activities, the materials handled may vary from large bags of grain to farm animals. Thus manual handling interventions must be farm and task specific.

2.7 Prevention

2.7.1 Importance of prevention

Prevention of a disorder is dependent on an understanding of its causative mechanisms. There is a tremendous need for early identification and prevention of manual handling injuries and MSDs. Prevention offers an alternative to the enormous personal and financial costs associated with lower back pain (and other injuries) and is an appealing proposition and an important challenge for the 21st century (Linton et al 2001)

World Health Organization (WHO) outlines three levels of prevention;
(1) Primary prevention, which prevents the clinical manifestation of a disease before it occurs,

(2) Secondary prevention, which arrests the development of a disease while it is still in the early asymptomatic stage, and
(3) Tertiary prevention, which minimizes the consequences of the disease.

Primary prevention is used to reduce the likelihood of the injury occurring this may be through the use of hazard identification risk assessment to determine the risk of injury when completing certain tasks manual handling aids could be used.
Secondary and tertiary prevention is difficult because in most instances, the ability to identify symptoms that are specific to development of MSDs is limited. So typically, secondary and tertiary prevention programs overlap, particularly those addressing the prevention of MSDs. The injured farmer may have to, limit daily exposure, or complete absence from farm work for a recovery period.

2.7.2 Prevention efforts in Ireland

Generally in Ireland the main prevention effort is manual handling training. The merits of training have been questioned recently as there is no evidence that training on it own has been successful in reducing manual handling injuries. The HSA has compiled information on injuries while handling, lifting or carrying as a percentage of total non fatal accidents. This information shows that in 1993 it was at just over 20% this rose to 32% in 2001. (HSA Statistics, 2005). This is solid evidence that training alone is not working in other sectors to reduce injuries.
Training is provided to comply with legislation to comply with insurance obligations, to inform workers of the hazards and because it is neat and cheap (Flynn 2000.)

In a study carried out in St Vincent's University hospital Dublin over a six year period the reported levels of back injuries in the student nurses reduced significantly (Flynn 2000.) However manual handling training was found to have only a very weak effect. Changes in education and work practice had a much greater effect. Prevention efforts must be multidimensional and address aspects of all risk factors.

Petit (2004) investigated the source and extent of manual handling problems in agricultural and horticultural enterprises in the UK. Farmers and growers were visited, to observe the improvements they have made which prevent or reduce the risk of injury from manual handling tasks, to record any concerns that they have, and any limitations that restrict further improvement.

Petit, (2004) found that 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 intermittent manual handling tasks, which are unlikely to be completely eliminated. Many of those working in agriculture suffer from historical MSD's, which can be reactivated at any time by these intermittent tasks so training in how to reduce risks (through good working practices) and proper manual handling technique remains important. 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.

Prevention offers an alternative to the enormous personal and financial costs associated with manual handling injury is an appealing proposition and an important challenge for the 21st century (Linton et al 2001).

Methods of reducing manual handling injury
Petit, (2004) looked at the methods used by farmers to prevent or reduce manual handling injury. Suggestions that were made are provided in appendix 2.

2.8 Training information and support for Irish farmers in health and safety

Naturally the education and training for most farmers has been passed from father to son. The major players in awareness and training in health and safety for farmers are farmer representative bodies, the HSA, DAF, Teagasc, FRS Network, Insurance companies, Universities, Colleges, Schools and the media.

The Health and Safety Authority set up a Farm Safety Action Group in February 2002. This group then developed the farm safety plan, which aims to combine the efforts of all organisations and individual farmers to allow a more structured and united approach to improving farm safety.
Details of some of the major commitments made by the major stakeholder are listed below

Department of Agriculture & Food

The Department of Agriculture and Food in 2002 provided for a module on health and safety to be included in the 20-hour training course, which is now mandatory for all applicants to REPS. This module gives awareness to farmers of the need to take health and safety into consideration in all their daily activities
The Department of Agriculture and Food will also incorporate the best safety standards available in all new and / or revised specifications.

FBD Insurance

- FBD encourage farmers to complete Safety Statements and promote safe farming practices at all times.
- FBD print and distribute safety statements to members of the farming community.

Farm Relief Services (FRS)

- Provide training in Safe Tractor Driving, chainsaw handling and manual handling to name a few
- They provide a health and safety service for farmers with the objective of improving the safety standards on farms.

Farm Tractor and Machinery Trade Association (FTMTA)

- Provide operational and safety training for all new machinery and equipment Supplied to farmers and contractors.

Health and Safety Authority

- Ensure that the CHILDSAFE programme (videos, CD-ROM and poster) is part of the curriculum for primary and second level students.
- Review the existing publications, which deal with guidelines for child safety.
- Promote the tractor driving skills training for 14-16 year olds at every opportunity, particularly during inspections.
- initiate discussions with relevant Third Level Institutions to discuss inclusion of health and safety in courses.
- assist organisations with such courses by providing speakers.

ICMSA.

- ICMSA will undertake to deliver HSA Farm Safety documentation to farmers in order to promote farm safety and raise awareness.
- ICMSA include a section on Farm Safety on all notices of ICMSA meetings throughout the country.
- ICMSA try to highlight the issue of Farm Safety at all meetings within their respective counties.

IFA

- Two, twenty minute slots per year on specifically identified farm safety issues to be addressed at each IFA County Executive.
- One, thirty minute slot per year on specifically identified farm safety issues to be addressed at meetings of both the IFAs National Industrial and Environmental and National Farm Family Committees.
- Two press articles targeted at the provincial press per year.
- Three farm safety articles per year for inclusion in the IFA page of the Irish Farmers Journal.
- Three national press releases per year on specifically identified farm safety issues.
- Allowing for the significant cost implications involved, IFA will seek to include information on farm safety with our direct mail out to members, which takes place approximately four times per year.

Macra Na Feirme

- Macra will create awareness by promoting the importance of operating a safe farm to our members.
- We will encourage our members to participate in farm safety events being run by the other organisations participating in the group.
- Newsletters will feature timely reminders of relevant health and safety issues.
- We will maintain the highest degree of safety at all of our competitions and will build a safety element into all stages of the competition.
- Macra will examine the possibility of running a safety competition on its website.
- The Ag / Hort Student Council will be used to disperse safety information and encourage participation by students in farm safety programmes (HSA 2002).

Teagasc introduced a National Farm Safety Programme in 2004, which will run until 2006 the main objectives of this strategy are

- that farmers, in maintaining a sustainable viable system of agricultural production, will adopt a safety culture that incorporates:
- the use of best practice/safe systems of farming, and
- the provision of safe plant, equipment and buildings
- that Teagasc farms, (Colleges and Research) will provide the model of farming that demonstrates best practice in terms of safety
- that key Health and Safety issues identified in the National Farm Safety Plan
- are incorporated into Teagasc programmes
- that farmers will have access to the information, training and advice necessary to farm in a safe manner

Programme Targets

The Farm Safety Programme differs from many of the other programmes in that many of the activities required for its implementation will not be stand alone activities but an integral part of other events, courses etc. The overall aim will be to have a safety input included in all appropriate public events and courses while at the same time

ensuring that centres, colleges, Monitor Farms, Host Farms and Discussion Group Farms adapt Best Practice in farm safety (Teagasc, 2005)

2.9. Safety and health behaviour among farmers

2.9.1 Farmer Behaviour

To effectively devise procedures to reduce manual handling and musculoskeletal disorders we must look towards the safety and health behaviour of Irish farmers. There is a general agreement among researches that people learn from experience (Skinner, 1983). To illustrate this we may take the example of a farmer loading 50kg bags of fertiliser into his fertiliser spreader. Due to the fact that he has had no previous injury from carrying out the task in the past he believes that there is no reason for this to change on this occasion. The physiology of the state of affairs means that we learn to take chances (Dunne, 2000). The farmer is secure in the knowledge that injury will not happen to him, he is in control.

2.9.2 Barriers to constructing positive behaviour

Traditionally safety campaigns have attempted to change an employee's attitude, often through fear messages, with the assumption that a change in attitudes will lead to a change in behaviour (Krause, 1997).

There are several problems with this assumption

- Firstly, attitudes are difficult to measure accurately with the old adage if you can't measure it, you can't manage it applying.
- Secondly attitudes are hard to change where familiarity and contentness prevail.
- Lastly, studies have shown that a change in attitude frequently results in no change in behaviour if environmental pressures are too strong, (Donohue, 2002).

To illustrate this we may take a situation where a farm labourer is given on the job training to demonstrate the correct methods of carrying out tasks involving manual handling. When the labourer returns to carry out his job on a different occasion the conditions may have changed. Some possible changes may be increased time pressures, increased work loads, slippery wet conditions or reduced lighting. These changing conditions will pressurise the farm labourer to compromise his safety in order to carry out the task under these conditions like carrying heavier loads to complete the task faster or because there is no one else to help.

The traditional attempts to change an individual's attitudes, motivation, risk perception or behaviour provide a tendency to focus on the individual and to exclude other factors of immense importance to include primarily the individual's environment (HSE, 1999).

2.9.3 Behaviour challenges

To effectively change behaviour, the first step is to recognise the need for improvement and to choose an appropriate method by which this change can be implemented (Hidley, 1998). Farmers realise that their profession exposes them to many manual handling problems each day and that there is a real chance of injury due to these hazardous tasks. The main problem is that many farmers believe that these hazards are part of the job (Dohonoue, 2002).

2.9.4 Understanding behaviour influences

The work environment relates to,

- people which encompasses, attitudes, values, prejudices locus of control, experience etc,
- logistics including policy procedures practices both written and unwritten, politics economy and the
- environment itself in relation to the totality of characteristics and features of the work being performed e.g equipment design, layout and condition (Covey, 1990).

These three elements combine dynamically to produce the antecedents that direct behaviour and the consequences that drive it (Covey, 1990). A major influence on ones behaviour is the behaviours of others with this 'observed' or 'learned' behaviour inherited without consideration given to its appropriateness (Purswell et al, 1993). Many children help out on farms and this provides the experience and skills that shapes the behaviour of future farmers. The knowledge and skills learned are not analysed or questioned by the child to determine if they are appropriate to the task. As the child ages these skills will be used repeatedly to perform tasks with little effort made to develop alternatives. A young farmer who has helped his father spread fertiliser using 50kg bags will be quite happy to continue this practice after his father's retirement.

2.9.5 Using farmer's perceptions of risk to promote safer manual handling on farms

If we can understand how farmers view the risks, then we could use this to devise ways of improving the relevance and effectiveness of programmes for promoting safe manual handling practices. In a study by Sandall, et al, (1998) using producers perceptions of risk to promote safer manual handling on farms, it was found that Australian farmers sub consciously classified different occupational health and safety risks into risks involved in the specific task rather than the broader type of action. We can thus conclude that efforts made to communicate information about these risks to farmers are more likely to be effective if they are framed in particular tasks that the farmer is familiar with. This however leads to a problem, as we must collect information on the specific tasks undertaken when injury occurred. This information must be collected to allow us to define the injury incidence from particular tasks and thus pinpoint the highest risk tasks to be investigated first. This would require an extensive study to allow a database to be drawn up and would only be effective if there was cooperation from health practitioners and all stakeholders.

2.10 Manual handling and agriculture

Agricultural practice ranges from highly mechanised operations employing state of the art technology machines to maintenance of subsistence holdings.

There are around 130,000 farmers in Ireland. In common with trends in all EU member states, farm numbers in Ireland have declined continuously over recent decades. The average annual decline during the past 10 years was 1.7% (Frawley, 2004). With the introduction of the decoupled payment on the first of January 2005 Irish agriculture is expected to change dramatically over the next number of years. It is expected that there will be a dramatic fall off in livestock numbers in all sectors with beef production expected to take the largest fall. Some commentators are expecting a drop of one third in the national sucker cowherd. FAPRI, (2004). It is expected that this will result an increase in farmers changing to part time farming and also an increase in average farm size in Ireland. These changes could have an impact on manual handling injury rates, as increased farm size will increase the risk of manual handling injury

2.10.1 Risk factors in agricultural tasks

Awkward postures

There is a need for constant handling and prolonged stooping during some tasks such as milking cows and feeding calves.

Repetion

Repetitive heavy lifting, bending and twisting together with repeating an action too frequently such as emptying 50kg fertiliser bags into a fertiliser spreader or emptying a 50kg bag of rolled barley into a feeding trough are common occurances on farms.

Vibration

Exposure to vibration is common when operating machines and exerting to much force is common when drilling holes with power tools. Farmers must work in the freezing temperatures of winters nights aswell as the scorching temperatures of mid summers days. Many farmers must work long days as farm labour is hard to source and finance.

Mechanical compression

The loads lifted by farmers are sometimes extremely awkward in nature calves that are wet, fragile and there is a need for impulse handling without adequate assessment (dosing cows is very unpredictable and constantly changing). Many of the tasks farmers undertake require the use of tools which can put excessive mechanical stress on the hands like shovels spanners knives and ropes to name a few.

Force

There is a current trend towards larger more powerful machine's which is evident by the steady growth of combined integrated baler wrappers and big triple section mowers together with the fact that sales of all tractors above 100hp have recently shown an increase, while sales of tractors below 100hp are declining (Breen, 2005). Strenuous and hazardous manual handling tasks are still required when coupling these increasingly heavier implements to increasingly larger tractors. These tasks have the potential to result in common musculoskeletal disorders among farmers (kirkhorne & Schenker 2002).

The quality and grade of machinery is increasing slowly but from a users perspective much of the research and development still centres on output with operation as a second thought. Engineering solutions must support positive development, for instance good usability and safety of the operator and not just development to increase the merits of the machine to do the job with the operator as a second thought (kirkhorne & Schenker 2002).

Increased use of biotechnology, information and communication technology are having an ever increasing influence on farm work. In a study by Shutske and Jennings (2002) it was found that the characteristics of farmers, workers, inputs, production practices and socio-economic environment are very likely to change due to the increasing use of biotechnology, information and communication technology in agriculture. Extensive research has been done on the food safety impacts due to the use of these technologies, but very little research has been conducted on the health and safety impacts of implementing these technologies into existing farm practices.

The major change these technologies are having on modern agriculture in Ireland is the change from physical activities to the use of automation, mechatronics and intelligent machines that may relieve the operator of some manual controls but as these machines become bigger and more complicated more long term effort and concentration is needed to work effectively. This leads to the evolution of routines and sub routines as the machine is carrying out many tasks at once it needs specific commands which sometimes means the operator will have to push or pull a number of levers or buttons hundreds of times during the day (Shutske and Jennings, 2002). A good example of this is new combined baler wrappers with one operator now doing the job of two balers and a wrapper, which required three operators.

Awkward postures

There is a need for constant handling and prolonged stooping during some tasks such as milking cows and feeding calves.

Dynamic factors

Unlike a cut or broken bone, the injury may not occur at one particular moment, but may be the cumulative effect of the daily strain and fatigue to muscles and ligaments.

2.10.2 Farmer and construction worker compared

The HSE (2005) undertook a better backs study among people in different industries through case studies

Farmer (Shepherd)

During clipping season I have to check all the ewes then gather them into pens of 40 ewes and clip. The ewes and lambs are then returned through the footpath. During the clipping I have to maneuver obstacles in the pen. I then have to pack the wool into woolsacks. During a typical day I will also carry a couple of sacks of feed and attach the trailer to the tractor. Amount lifted per day: 3, 320 kgs in clipping season (June - July) based on maneuvering 80 ewes, carrying a couple of sacks of feed and attaching the trailer to the tractor.

Builder (Logistics Manager)
In a typical day I would be involved in moving materials around the building site and lifting loaded boxes around. I also spend time lifting and transporting tools for various different tasks. Amount lifted: 3,550 kgs based on the tasks outlined above in an average working day

When these two case studies are compared it is obvious that there is very little difference in weights lifted by the farmer and builder. The builder however will not be allowed to go on site without being trained in manual handling something the farmer will be unlikely to encounter (HSE, 2005)

2.11 Barriers to reducing manual handling problems

Agricultural tasks range from highly mechanized operations employing state-of-the-art technology to small farms with minimal mechanization relying on manual labour to carry out day to day tasks (Fenske and Simcox, 1995). The identification of occupational health hazards and the development of systems to control, and decrease manual handling injury can be quite labour intensive and require extensive agricultural and occupational health knowledge.

There are many barriers to the development and implementation of a program to prevent musculoskeletal disorders. Some factors include limitations with existing information programs and injury reporting mechanisms used for agriculture. Workforce issues consist of the seasonal nature of certain tasks such as calving, which leads to farmers hiring temporary labour at certain times of the year.

Cost issues may also delay introduction of appropriate hazard controls. The majority of farms are small businesses with low profit margins average family farm income in 2003 was €15,054, www.teagasc.ie (2005). Therefore available funding for activities not associated with the day to day operation of the farm may be limited.

Another barrier to a successful injury or illness prevention program in agriculture is the lack of available information to identify hazards and risk factors.
Much of the information on hazards and risk factors to date is borrowed from other industrial sectors and generalized to agriculture (Meyers, 1995). This may present problems since agricultural work is unique among Irish industries and because people of all ages are at risk of being injured while in a work setting. This occurs because farms are both work sites and homes, with farm employment being equivalent to employment of the whole family.

Additionally, agricultural work has long cycles, as compared to manufacturing or assembly work, which has short job cycles. Agricultural work is diverse with tasks varying from day to day and occurring in various environmental conditions, as well as utilizing tools and tasks that are job specific (Sesto, 2002). Given these differences, it is important to be aware of the relevance and the problems of trying to generalise this information to the agricultural sector.

3. Methodology

Many risk factors associated with the development of manual handling injuries are commonplace in agricultural tasks. Unfortunately, there has been limited application of research related to manual handling injuries and back pain in agriculture although many farmers frequently report musculoskeletal signs and symptoms (Myers et al., 1995). In forestry and construction occupations, which are similar to agriculture due to the heavy nature of work and variability of environment and tasks, research and application of recommendations has had had a favourable affect on manual handling problems.

Two of the more important changes being the reduction of the weight of cement bags for construction and fertilizer bags for forestry to 25kg but farmers though they have benefited by the presence of cement in the smaller 25kg bags they still find themselves limited to the 50kg version of the fertilizer bag when machinery constraints does not allow the use of larger versions.

The rigorous nature of farm work exposes workers to a number of risk factors that have been associated with manual handling injuries and musculoskeletal disorders. Heavy lifting, working in awkward positions for a prolonged period of time, and poorly designed tools and implements take a toll on both farmers and farm workers and make musculoskeletal conditions the most commonly reported health problem (NIOSH, 2000).

3.1 Collection of information

Collection of information on the topic was carried out through the use of a literature review, which was initially carried out by an internet search. This search provided a wide range of information on the subject. The search provided many names of people working in the area in Ireland and abroad. Many of these people were contacted through email, post, phone call or visited personally. After examining the information collected some gaps were uncovered especially from an Irish viewpoint, as much of the information available is specific to foreign countries to which Irelands systems of farming do not compare well. There was a great deal of information on back structure

but there was a noted absence of statistical information specific to manual handling injuries and musculoskletal disorders among the farming community in Ireland. To fill the gaps found in the information a survey questionnaire was designed.

3.2 Design of survey

This survey questionnaire was designed to determine the current position of Irish agriculture from a manual handling perspective and to gather the required information that would allow an informed evaluation of any problems and possible solutions. A postal questionnaire was used because it allowed the collection of information from a larger sample. Postal surveys are routinely used to obtain information from people within the general population, over a range of topics. Postal surveys are a cost-efficient method compared with intensive methods such as face-to-face interviews and capable of obtaining, information on large numbers of people. A key quality component of postal surveys relates to the number of people sampled, and the proportion returning a completed useable questionnaire. Lower response rates can reduce the statistical power of the study, and mask statistically significant relationships, which 'truly' exist within the population studied. Responders may also be different to non-responders. This can introduce bias into the survey findings, if the decision to respond (or not) relates to the outcome being analysed within the survey, (Edwards, 2002).

Many studies conclude that non-responders in surveys and other epidemiological studies can differ to responders with respect to a range of specific health, lifestyle and social variables. Non-responders have been found to differ with respect to their sex, age, race, social class, home circumstances, education, and healthy lifestyle behaviors. Nevertheless, nonresponse bias should always be considered a possibility. There is however, no agreed level of acceptable response in postal surveys. (Edwards, 2002)

3.3 Format of survey

Designing and formatting a suitable questionnaire entails more than well-defined concepts and distinct phraseology. There are several factors that must be taken into consideration such as, the order in which the questions are asked their appearance and even such things as the questionnaires physical size (Jeffrey, 1986)
The first stage in this research study was to design and format the initial pilot survey to provide the necessary information. It was designed to accommodate all the research objectives in sufficient depth and breath to satisfy the information requirements. A list of the required information was developed. Information that was currently available and present in the literature review was eliminated from the list.

The pilot survey questionnaire was then developed. During the design of the questionnaire consideration was given to potential responses in relation to deciding on various techniques for illustrating results be it frequencies, percentages, rankings, or narrative remarks.

The survey was designed from a respondent's perspective to remove confusion and allow quick trouble free completion. The questionnaire follows a clear sequence from initial questions on basic demographic data, following on to more specific question such as presence or absence of back pain. The wording of the questionnaire and the order of the questions have been designed to avoid respondent irritation and annoyance, which could result in a poor response rate. Most questions were designed to allow the respondent to tick the appropriate box while some questions were open ended and required the respondent to provide additional information that was farm specific.

The questionnaire was designed to be short, concise and to the point. Researchers have found that long questionnaires are apt to induce respondents fatigue and errors and contribute to higher non-response rates (Newsome et al, 1980)

3.4 Survey sampling

The pilot survey was sampled locally in Co Roscommon. The information obtained during this sample indicated that the survey questions were understandable and did not cause confusion. The finalised questionnaire was then copied and distributed to farmers in the chosen research area.

3.5 Research area

A critical element in any survey questionnaire is to locate or cover all the members of a population being studied so that they have a chance of being sampled, (Dillman et al, 1995). The sample area was chosen because it is representative of the type of farming practice that exists in the Connaught region.

Teagasc Roscommon compiled the list of farmer's names and addresses through random selection of farmers in the county. The list of names provided allowed a high level of penetration into the different farming systems.

As the mailed questionnaire did not allow any face to face consultation, a cover letter detailing the aims of the study, the importance of each response, the confidentiality of the response, information on where the farmers name and address was received and a contact address and phone number for any queries.

3.6 Format of questionnaire

The questionnaire was divided into 8 sections.
Section 1 contained general questions on demographics.
Section 2 focussed on manual handling injuries who received them what caused them and what was being done when they occurred.
Section 3 focused on back pain its presence and severity
Section 4 focused on information and training received
Section 5 focused on purchasing of goods for the farm and how these purchases may affect the farmer's ability to reduce manual handling load.

Section 6 focused on the risks of manual handling on a wide range of farms to determine the risk through determining the likelihood of the task being undertaken and the severity of the risk.
Section 7 focused on the presence of manual handling aids on the farms
Finally section 8 investigates if farmers awareness was raised by completing the survey and if the believe they are currently adequately informed or is more information and support required.

3.7 Questions explained

3.7.1 Demographics

1. Farming system? The respondent was given a list of farming systems to choose from. This question was asked to allow comparison to be made between the different systems to see the problems that exist and are possibly specific to individual systems.

2. Farming size (Ha) as per Area Aid return? This question was asked to allow investigation of manual handling problems on different sized farms.

3. Martial status of main farm operator? This question was asked to determine if the main farm operator was married and thus if having the support of a spouse had an effect on manual handling injury.

4. (a) **Age group?** The main farm operator's age was asked to determine if the presence of manual handling problems and injuries was influenced by age.

(b) **Gender** This question was asked to determine if gender of main farm operator influenced the presence or absence of manual handling injuries.

5. People who participate in farming activities on the farm? This question was asked to determine who provides the additional labour on the farm when required and if the presence of these people results in a lower prevalence of manual handling problems and injuries and if they themselves have suffered manual handling injuries.

6. (a) Does the main farm operator engage in off farm employment? This question was asked to determine if the main farm operator engaged in off farm

employment and if yes, was it full or part time. The collection of this information allows us to determine if off farm employment influences the frequency of manual handling injuries.

(b)Does spouse engage in off farm employment? This question was asked to determine if the main farm operator's spouse engaged in off farm employment and if yes, was it full or part time. The collection of this information allows us to determine if off farm employment influences the frequency of manual handling injuries.

3.7.2 Manual handling injuries

7. Please indicate if any of the following people working on the farm have suffered a manual handling injury by indicating the principle cause of the injury. This question was asked to determine if a manual handling injury had occurred to anyone on the farm, what was the main cause and what task was being carried out when the injury occurred. As manual handling on farms is task specific this question allowed for the collection of information on the main tasks that were carried out when the injury occurred and their frequency. This information is required when developing information and training campaigns in order to alert farmers to the hazards that are present when carrying out certain tasks and allow for the development of controls to combat the high risk areas first.

8. Please indicate on the table below the type of weather when the injury occurred, the time of day and the type of injury suffered. This Question was asked to see if weather conditions and time of day had any influence on the presence of manual handling injuries. Respondents were also asked to indicate the principal injury. This information was sought to find the proportion of farmers and farm workers having experienced certain type's of manual handling injuries and to investigate if there were any trends noticeable.

8. Please circle body parts affected and give the title of the person affected. This question was asked to determine what parts of the body are affected by manual

handling and the proportion of respondents affected. Information from this question can be used to inform farmers of the main areas of the body affected by manual handling tasks in agriculture.

3.7.3 Back pain

9. Has the main farm operator suffered from back pain? This question was asked to determine if main farm operator suffered back pain. This information was sought to determine the proportion of farmers affected and the thus allow for the development of conclusions about the severity of the problem of manual handling in agriculture

10. Was the pain initially caused by, general farm work, off farm work, or leisure activities? This question was asked to determine the initial cause if one was noticed, as the injury may be cumulative. This information allows us to determine the proportion of respondents who believe back pain was caused by farm work as if not what did cause it.

11. (a) Was back pain experienced in the past? This question was asked to determine when back pain was last experienced. Information from this question allows for investigation of the persistence of the pain and its prevalence.

12. How would you rate the pain on a level of 1 to 5, (1 ache - 5 unbearable)? This question was asked to determine the severity of the pain which can indicate farmer discomfort, stress and the disabling nature of back pain

13. (a)Was medical treatment sought for the back complaint? This question was asked to determine if medical treatment was sought for the complaint. This information can be used to determine the cost to those affected and an indication of the disabling nature of the condition

(b) If yes please indicate where treatment was sought. This question was asked to determine the possible sources of treatment and the proportion of farmers who have used these.

14. Is back pain currently experienced when carrying out manual handling tasks? This question was asked to determine if manual handling tasks result in back pain

15. Does the pain impose limitations or cause discomfort. This question was asked to determine if back pain had imposed limitations on farm work, off farm work and leisure activities to further emphasise the disabling nature of back pain.

16. Have you experienced back pain that was in the past or is currently?

(a) more severe in the morning with improvement during the day?

(b) more severe during the day?

(c) more severe at night sometimes affecting sleep?

(d) experienced down the leg to below the knee?

(e) accompanied by numbness, tingling, and has effected bowel movement

These questions were asked to categorize the disorder according to symptoms to determine the reason for the pain as detailed in Levy and Wegman, (2002) for example inflammation, mechanical infection, sciatica and Claudia equine syndrome respectively. This information can be used to determine the most prevalent type in farmers

3.7.4 Advice and training on manual handling

17 (a). Please indicate if you have received information on Accident prevention, Occupational ill health and Manual handling This question was asked to determine what information was received by farmers on health and safety issues and to evaluate its quality and effectiveness. It also allows the investigation of its influence on manual handling injuries

18. Have you received manual handling training. This question was asked to determine if respondents had received manual handling training. This information can be used to investigate the presence of manual handling injuries on those with and without training and allow for some the evaluation of the effectiveness of the manual handling training.

19. Please indicate where you receive most information and advice on health and safety issues? This question was asked to determine where farmers receive their information on health and safety issues. This allows for the investigation of these sources to determine who are the main sources and show the input of various other sources.

3.7.5 Purchasing policy for the farm

20. When purchasing items for the farm in what form is the major proportion of concentrates fertilizer and machinery purchased This question was asked to determine the proportion purchased in each category, which allows for evaluation of its effect on manual handling problems.

For questions 21, 22, 23, and 24 respondent was asked about the loads lifted, the effort required, the conditions in which some tasks take place and the specific nature of a task that make it a high risk from a manual handling point of view.

3.12 Equipment that helps to reduce manual handling

25(a) Please indicate if any of the following equipment is used on the farm
This question was asked to determine what type of equipment exists on farms to eliminate or reduce the need for manual handling their proportion and also to allow farmers to add items or ideas to the list that they believe should be included

26. Do you believe completing this questionnaire has raised your awareness of manual handling issues This question was asked to determine if filling out the questionnaire had made them think of manual handling issues and raised their awareness of it on their farm?

27. Do you feel more information should be given to farmers on manual handling? This question was asked to determine if farmers thought the level of information and support provided to farmers was sufficient.

3.8 Response rate

The response rate to the questionnaire was good. 380 questionnaires were sent out and 112 were returned. 29.4% of farmers returned their questionnaires, which is a high response rate for this group. There is however, no agreed level of acceptable response in postal surveys. (Edwards, 2002). The response rate was good when considering that the average response rate now lies between 10-15% (Lang, 2002).
A copy of the questionnaire is provided in appendix 1 at the back

4. Results

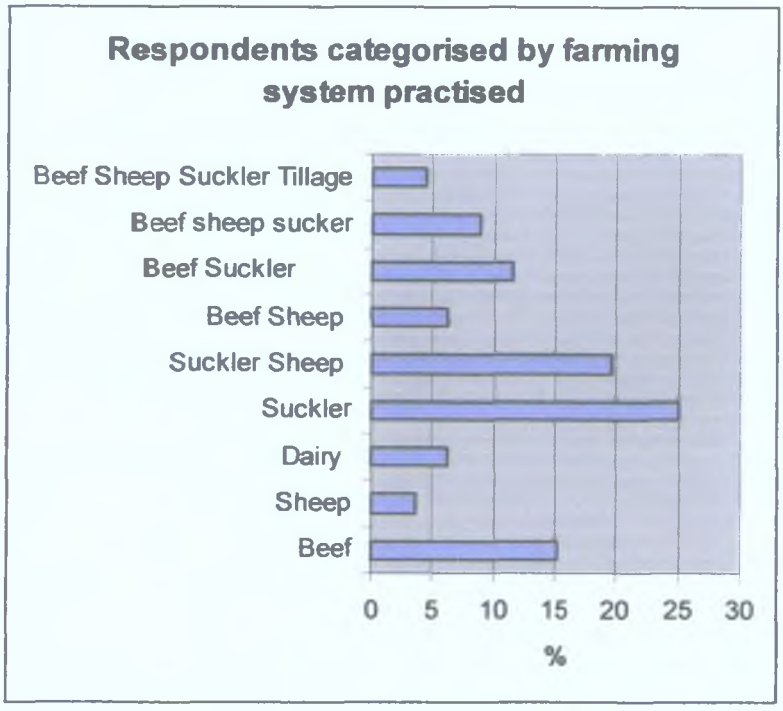
4.1 Results of survey

4.1.1 Demographic information

Question 1. Respondents were asked to pick the type of farming system they practice on their farms.

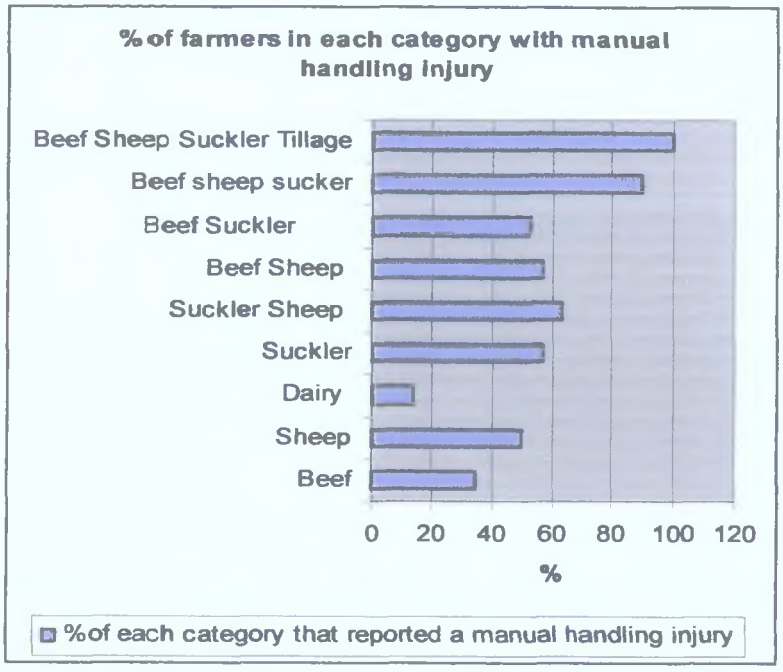
As can be seen in figure 4.1(a) the suckler cow system accounted for 25% of farming systems in the area. Mixed suckler and sheep farms accounted for close to 20% of the farming systems in the sample area.

Fig 4.1(a)



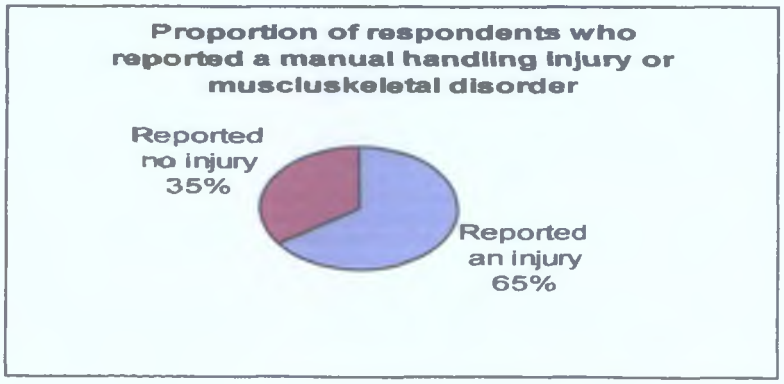
As can be seen in figure 4.1(b) respondents who operate a beef, sheep, suckler and tillage farm all reported to have experienced a manual handling injury. 90% of respondents who operated a beef, sheep and suckler farm reported a manual handling injury on their farm. Close to 60% of suckler farmers reported manual handling injury.

Fig 4.1(b)



In figure 4.1 (c) it is shown that when all the systems are amalgamated 65% of respondents reported to have experienced a manual handling injury or musculoskeletal disorder.

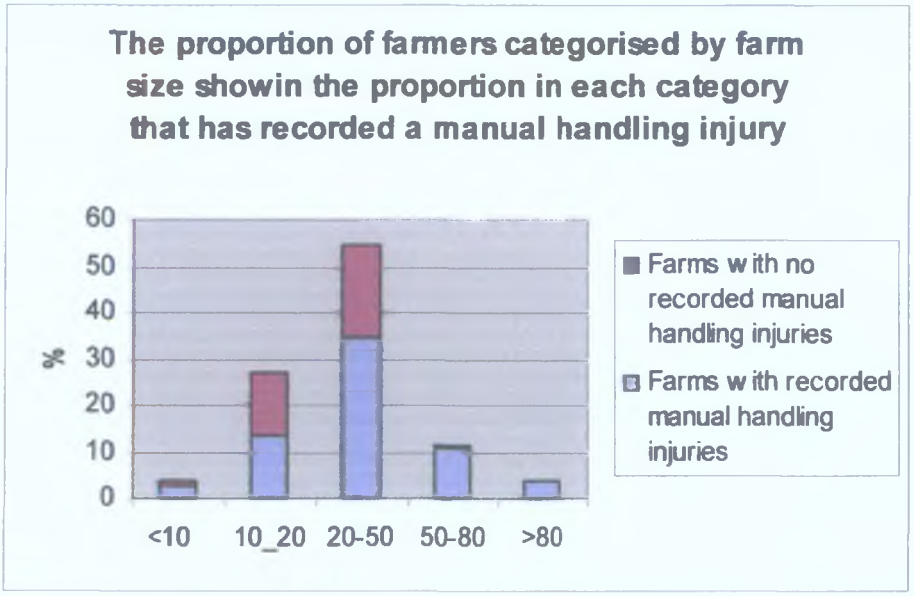
Figure 4.1 (c)



Question 2 asked respondents to indicate their farm size

In figure 4.2 the farm size of the respondents is illustrated. Average farm size was 25-50ha with close to 60 % of respondents falling into this category. This is similar to the national average of 33.6 ha (Frawley 2002). In this category 20% reported that a manual handling injury had occurred on their farm. In the 10-20 ha category 10% of respondents reported a manual handling injury in this survey. The frequency of manual handling injury was shown to increases with farm size.

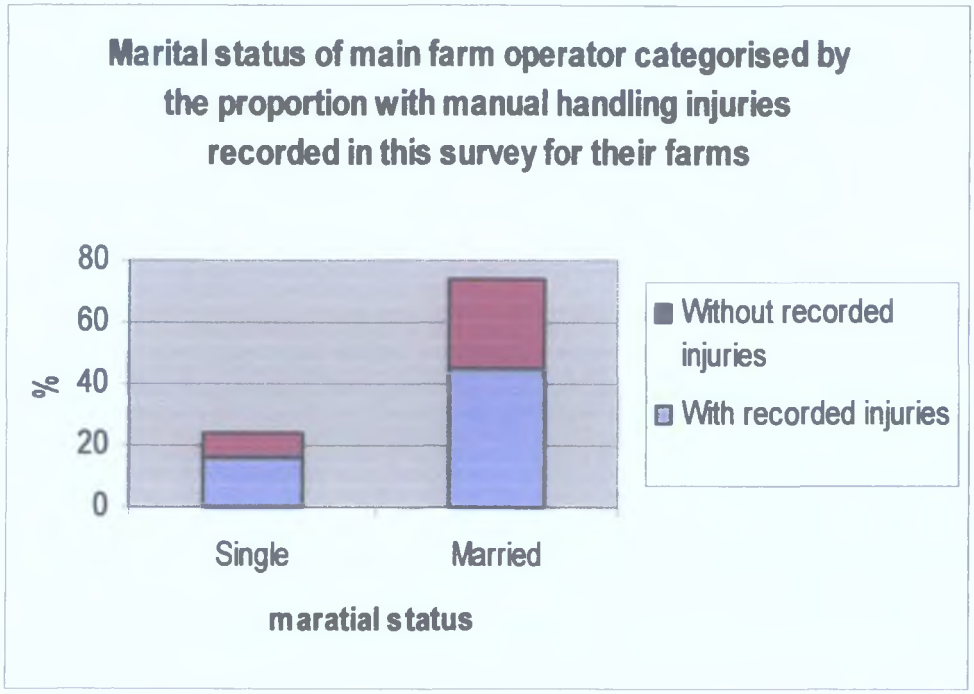
Fig 4.2



Question 3 asked the respondent to indicate their martial status

The martial status of respondents is illustrated in fig 4.3 below. 75% of respondents were married with 55% of these reporting a manual handling injury had occurred on their farms. The remaining twenty five percent were single with about 20% percent of this group reporting an injury on their farm due to manual handling.

Fig 4.3

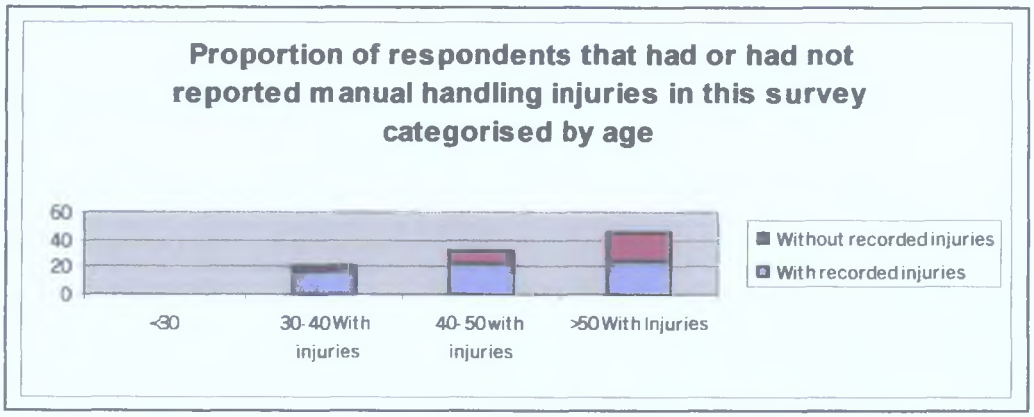


Question 4 asked the respondents to indicate their age category.

As shown in Figure 4.4 below 42% of respondents were in the >50 years age bracket and 23% percent were in the 40-50 years age bracket.

A definite trend towards a higher proportion of respondents with injuries as age increases is shown below. Those with reported injuries due to manual handling rise from 19% of respondents in the 30-40 years age group to 22% of respondents in the >50 years age group.

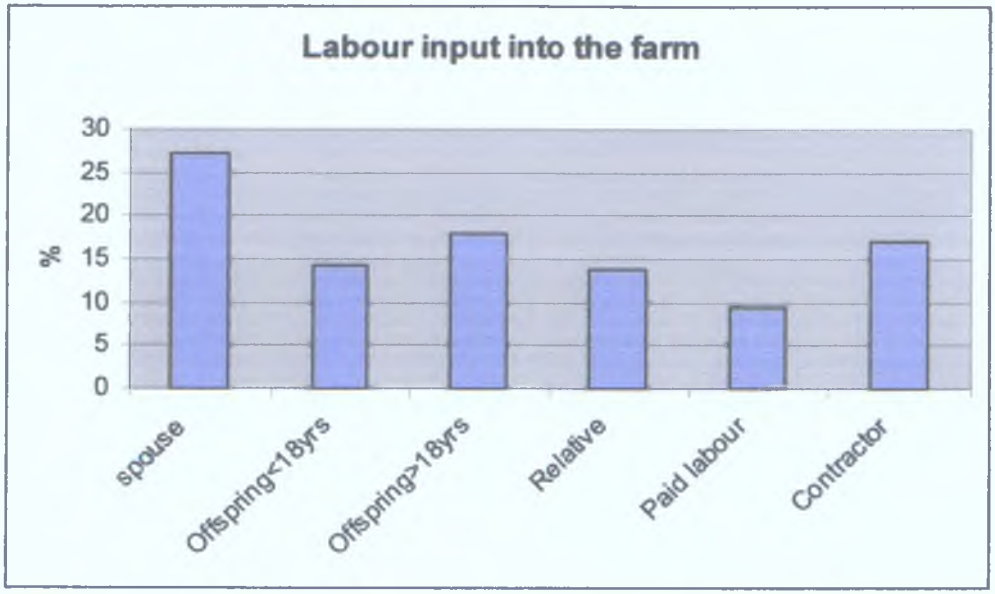
Figure 4.4



Question 5 asked the respondent to indicate who provides additional labour on the farm.

As shown in figure 4.5 below 25% of spouses participate in farming activities. The main farm operator's offspring over 18yrs and the contractor help out on 18% of farms respectively.

Fig 4.5



Question 6 (a) asked the respondent to indicate if they engage in off farm employment and if so part time or full time.

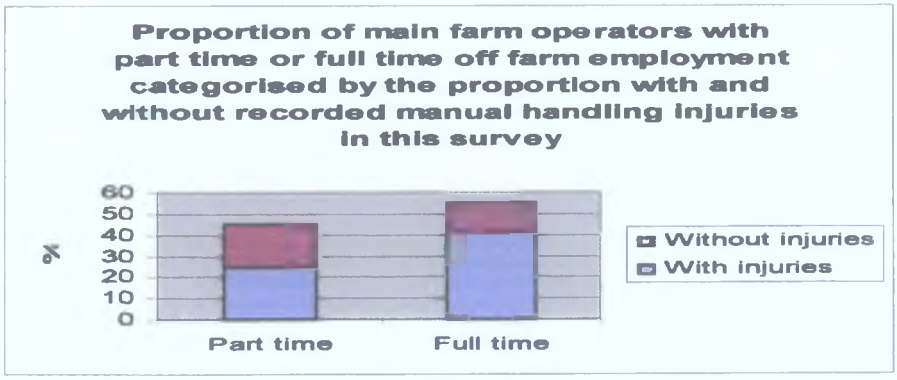
Figure 4.6 illustrates the proportion of main farm operators with off farm work. 50% of respondents claimed to be engaged in off farm work, 50% % of respondents with off farm work reported a manual handling injury. When the respondents with no off farm employment are investigated 35% of this group reported to have had a manual handling injury on their farm.

Figure 4.6

	With injuries	Without injuries	Total
With off farm job	25%	25%	50%
Without off farm job	35%	15%	50%

Figure 4.7 illustrates that of the 50% working off farm, 55% were working off farm full time with the remaining 45% working part time. As shown in figure 4.7, farmers who work off farm full time are at higher risk of incurring a manual handling injury then their colleagues who work off farm part time.

Figure 4.7



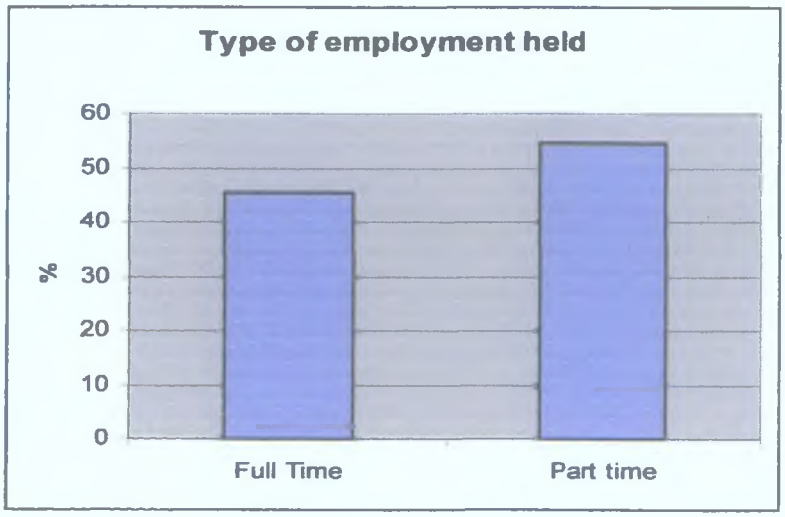
Question 6(b) asked the respondent to indicate if the spouse engages in off farm employment and if so is it full time or part time

Figure 4.8 shows that 43% of main farm operator's spouses are engaged in off farm employment. This is much higher than the national average at 24.8% in 2002. Teagasc National Farm Survey (2002).

Figure 4.8

Figure 4.9 shows the type of employment held. 45% of spouses who work off farm full time with the remaining 55% holding part time jobs.

Figure 4.9



4.1.2 Manual Handling Injuries

Question 7 asked the respondent to indicate if any of a list of people working on the farm have suffered a manual handling injury by indicating the principle cause of the injury and detail what was being done when the injury occurred. Of the 72 respondents reporting to have had a manual handling injury collective strains was given as the reason for injury by 25% of main farm operators while lifting was the reason given by 25%. Cumulative strains and injuries due to lifting are the two most frequent causes of injuries in farmers. There was insufficient data provided to present the same information on the other people listed this in this question. Please refer to appendix 1. to view questionnaire.

Figure 4.10

Tables 4.1(a)-(f) provides information that was given by respondents to the final part of question 7 when respondents were asked to describe the task that they were carrying out when the injury occurred if known. Many farmers noted more than one possible task was responsible for injury while some did not specify any task.

Table 4.1 (a)

Tasks involving machinery that lead to back injury

Task undertaken	No. of respondents
Fell through asbestos roof while doing maintenance	2
Injured attaching car trailer to car	6
Injured attaching transport box to tractor	2
Injured putting crates on trailer	1
Injured closing loading door on trailer	1
Injured loading roll of net wrap into baler	1
Injured when trying to turn spout of slurry agitator	1
Injured when trying to couple PTO shaft to tractor	1
Injured filling drums of diesel into tractor	3
Injured putting dual wheels on tractor	2
Injured when removing wheel from vacuum tanker to repair puncture	1
Injured when positioning suction hose for vacuum tanker on transport brackets	2
Injured when lifting vacuum tanker suction hose out of slurry tank	3
Injured when repositioning discharge spout on rear of vacuum tanker after cleaning blockage	1
Injured when coupling rotary mower to tractor	1
Injury due to long periods of tractor driving	4
Injured when trying to change bucket on digger	1

Table 4.1 (b)

Tasks involving machinery, which led to manual handling injury

Task undertaken	No. of respondents
Broke leg when slipped on steps exiting tractor	1
Severe burns fractures when got wrapped in PTO shaft of tractor driven bench saw	1
Severe burns when poorly informed operator opened bum on gearbox to check oil level to find very hot oil poured out on his hand. This was due to incorrect positioning of machine for inspection and the oil being hot due to the machine had been in use all day	1
Busted finger when it got caught in hole when trying to line up top link pin on the tractor when coupling machine.	1
Lost finger when it got caught in muck spreader drive chain while repairing it	1

Table 4.1 (c)

Miscellaneous tasks that resulted in back injury

Task undertaken	No. of respondents
Injured when trying to reposition meal-feeding trough	1
Injured when trying to empty water trough to mend leak	2
Injured when driving stakes manually	3
Injured when unrolling fencing barbed wire	1
Injured filling fertilizer spreader	5
Injured when trying to close round feeder	1
Injured closing a heavy gate	2
Injured carrying manure in wheel barrow	1
Injured when struck by swinging sheeted door	1
Injured taking back cover on silage pit	4
Injured when slipped off the edge of silage pit when taking back cover	1
Injured when trying to reposition meal-feeding trough	1
Injured when trying to empty water trough to mend leak	2
Injured when driving stakes manually	3
Injured when unrolling fencing barbed wire	1

Table 4.1 (d)

Miscellaneous tasks that resulted in manual handling injury

Task undertaken	No. of respondents
Severe laceration when hand saw jumped while cutting a bush	1
Severe lacerations when barbed wire snapped when straining it. Wrapped around lower body	1
Laceration on hand when galvanised sheet slipped through hands while sheeting	1
Laceration on side of head when tool fell of top shelf and struck respondent on side of head	1
Lacerations and burns on hand when jumper sleeve got caught in pulley wheel of milking machine	1
Broke toe when heavy gate dropped on it	1
Injured when turned on ankle after stepping into a hole in the yard	1
Injured when fell in shed due to tripping when trying to feed meal	1
Injured when temporary platform collapsed when building a wall	1
Injured when slipped of bales when trying to chase neighbours hens off them	1
Injured when loading small square bales on to trailer	1
Injured when slipped off bales in shed when stacking	1
Injured when trying to remove large stone from base of trench	1
Injured lifting slats	4

Table 4.1 (e)

Tasks involving animals that lead to back injury

Task undertaken	No. of respondents
Injured tagging calves	1
Injured castrating cattle	3
Injured dosing cattle	5
Injured calving cows	5
Injured sculling	2
Lost finger when it got caught between cow and crush	1

Table 4.1 (f)

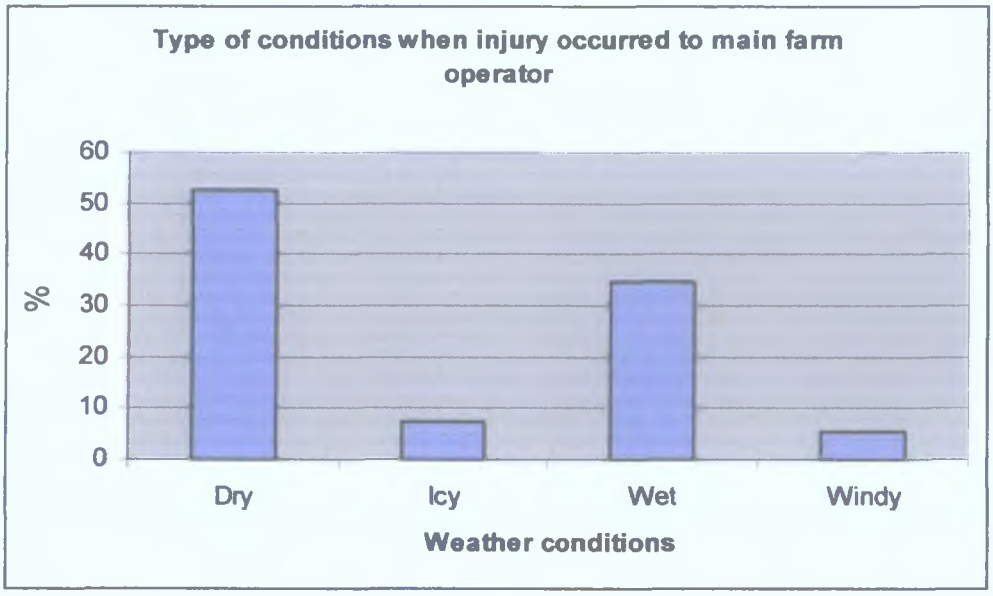
Tasks involving animals that lead to manual handling injury

Task undertaken	No. of respondents
Injured when kicked by a bull	2
Injured when kicked by a cow	1
Injured when pucked by a ram	1
Injured when pucked by a bull	1
Injured shearing sheep	3
Injured when pinned against wall by cow	1
Injured when paring sheep's feet	2
Injured when holding sick cow receiving blood transfusion due to red water.	1
Injured when attempting to remove calve with vet during caesarean section.	1
Injured when trying to put lifting harness on cow that had gone down after hard calving	1
Injured when lifting lambs on to upper deck of trailer	1

Q 8 (a) Respondents were asked to indicate the type of weather conditions when the injury occurred, the type of injury **suffered and the time of day.**

Figure 4.11 illustrates the conditions when injuries known to be caused by poor manual handling practice occurred. Manual handling injuries recorded in this study involving the main farm operator took place largely in dry conditions while 35 % of respondents reported injuries occurring in wet weather. There was insufficient data to present information on type of weather conditions when injuries occurred to others working on the farm.

Figure 4.11



Respondents were also asked to indicate the types of manual handling injuries affecting main farm operators

These injuries are illustrated in figure 4.12 below. Of those who reported a specific injury 15 % reported strains to be the type of injury affecting them. 10 % of respondents reported sprains while a further 8% reporting slipped discs to be the main injury incurred. Many farmers indicated they were affected by more than one type of injury

Figure 4.12

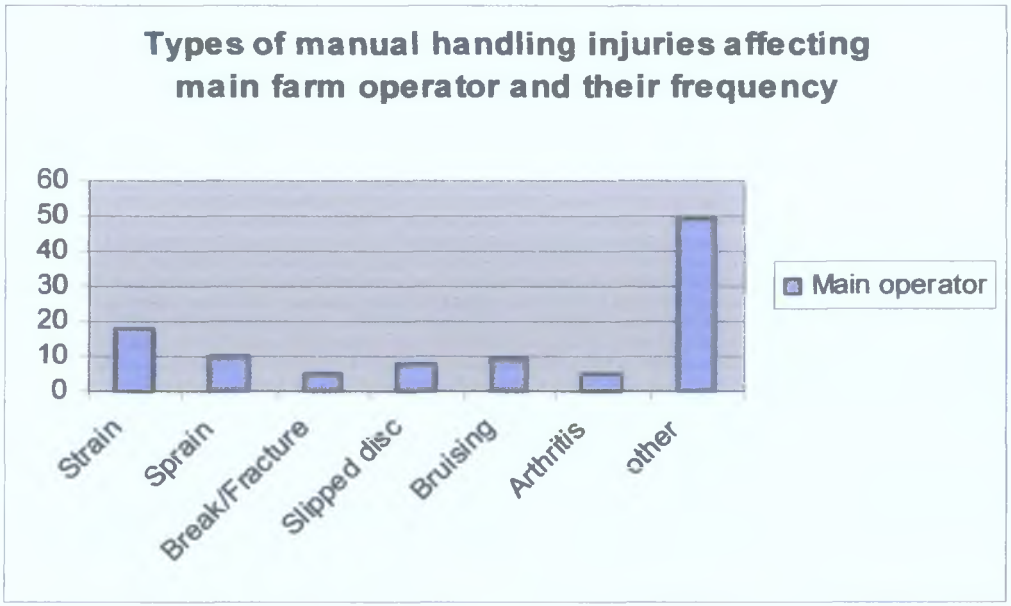
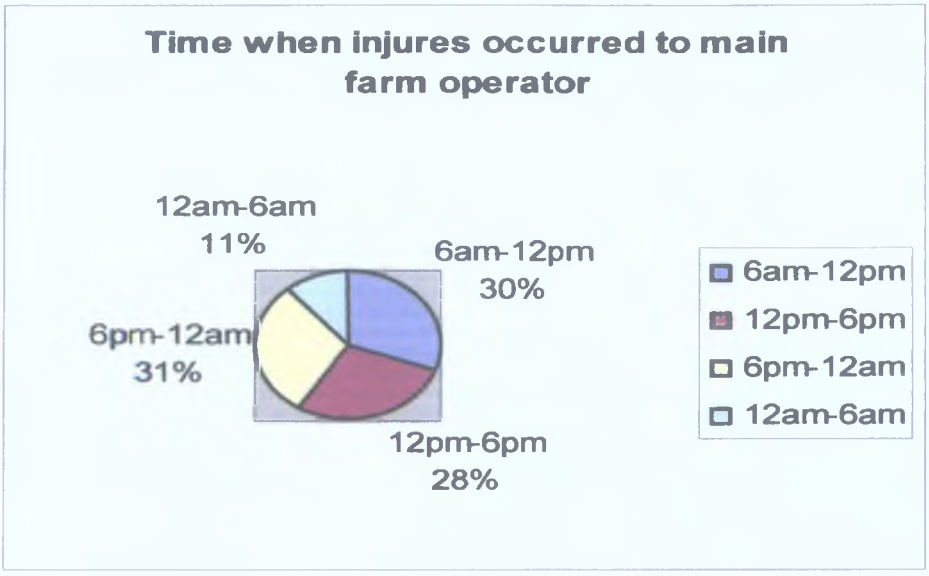


Table 4.2 Of those in the other category the following injuries were reported.

The other injuries recorded in this study were	Number of respondents reporting these injuries
Damaged intervertebral disc	6
Pinched nerve in the spine	3
Osteoarthritis	7
Facet joint arthritis	1
Ruptured disc	2
Sciatica	4
Herniated disc	5

The time when injuries occurred to the main farm operator are illustrated in figure 4.13 below. Of those respondents who reported a specific cause 30% of respondents said their injury occurred in the morning from 6am-12pm. We see another peak in the 6-12 pm time bracket.

Figure 4.13



Question 8(b) asked respondents to circle body parts affected and give the title of the person affected

Illustrated below in Table 4.3 are the principal areas of the body affected by manual handling injuries. Over 60% of main farm operators reported the lower back to be affected by the manual handling injury. The ankles, knees and hips were reported by 6.6%, 5.5% and 11.1 % of respondents to be affected by manual handling injuries. Many respondents reported that more than one body part was affected. There was insufficient information given on injuries to body parts of others who work on the farm to display in this report.

Table 4.3

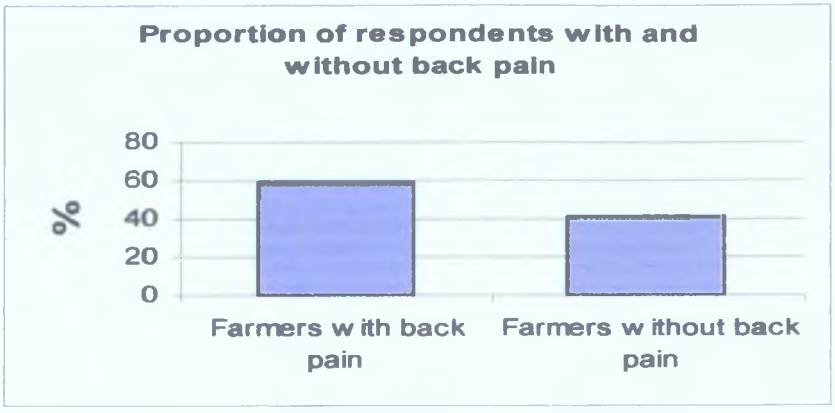
Body parts affected by manual handling injuries	Total number of respondents with manual handling injuries categorised by the percentage with specific body part injured
	%
Head	1.3
Neck	2.2
Shoulder	3.5
Elbow	2.4
Wrist	2.1
Abdomen	2.1
Upper Back	2.2
Lower Back	61.1
Hip	11.1
Knees	5.5
Ankles	6.6

4.3 Back Pain

Q 9 Asked if the main farm operator suffered from back pain?

Figure 4.14 illustrates the fact that 62% reported yes to experiencing back pain.

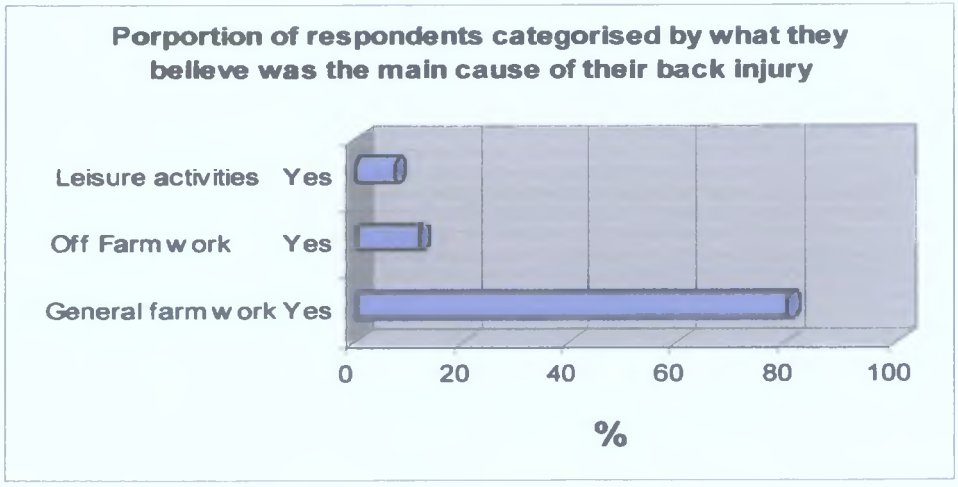
Figure 4.14



Q 10. asked was the pain initially caused by? Leisure activities, off farm work or leisure activities

Figure 4.15 shows that close to 80% of respondents believed general farm work was the main cause of their back injury. 10% believed it was leisure activities and 13% off farm work.

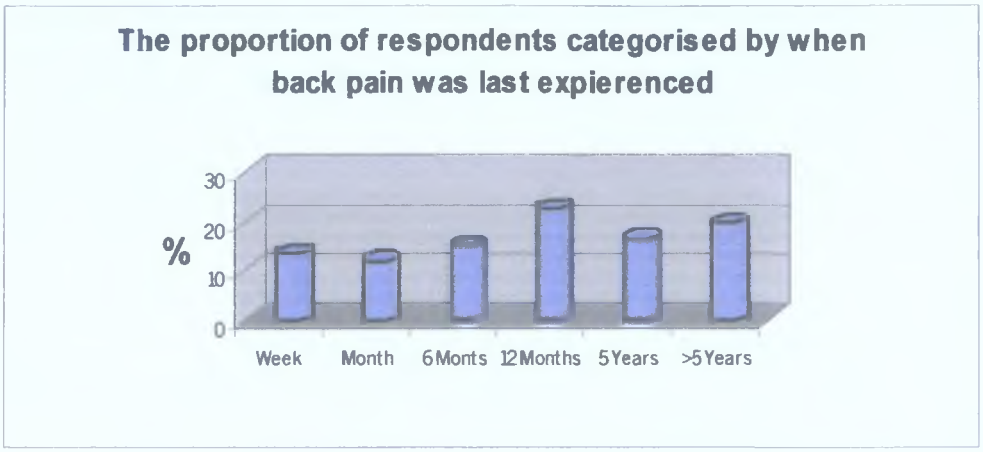
Figure 4.15



Q11 (a) asked when back pain was last experienced

As shown in figure 4.16. 15% of respondents said they had experienced back pain in the week prior to completing the questionnaire. 64% of respondents reporting they had experienced back pain within 12 months of completing the questionnaire.

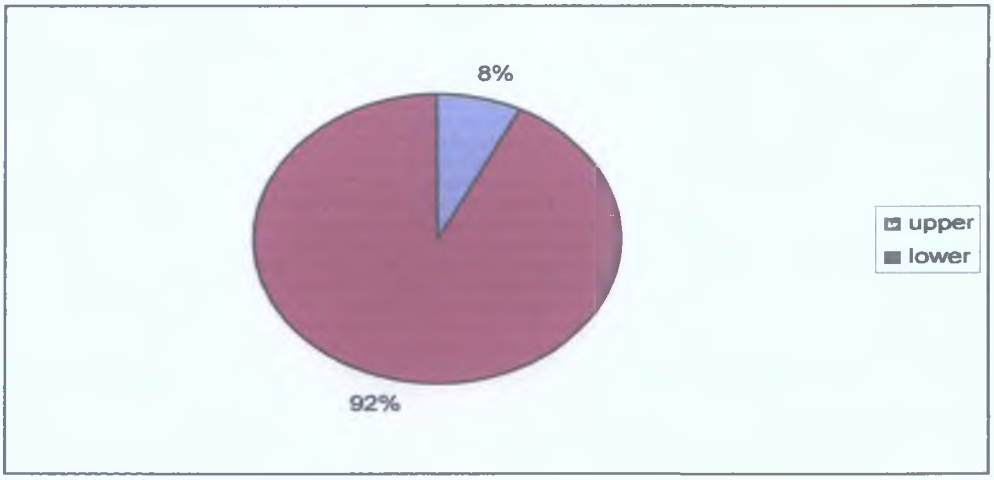
Figure 4.16



Q11(b) Asked where in the back was the pain experienced.

Figure 4.17 shows that 92% of respondents with back pain reported that their back pain was localized to the lower back.

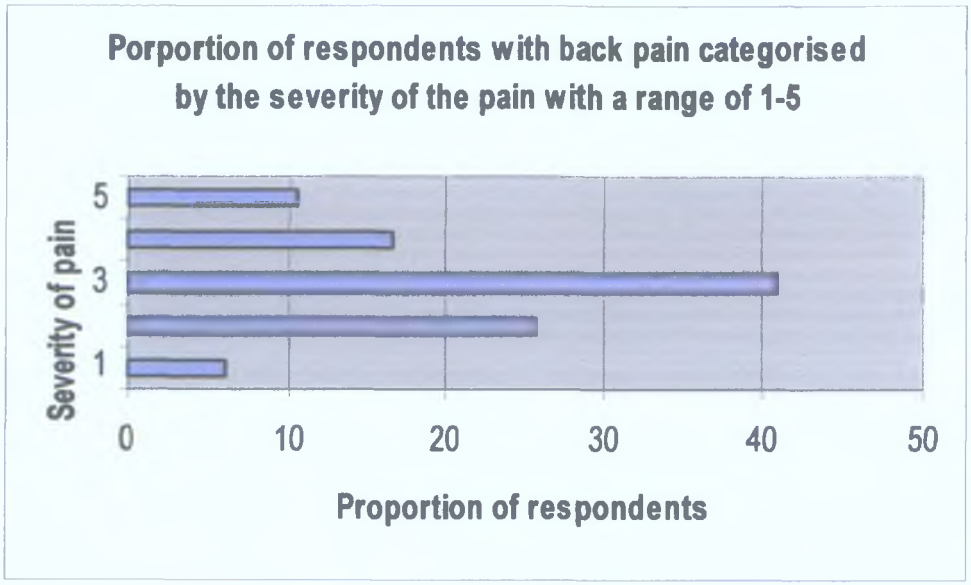
Figure 4.17 Proportion of respondents affected by upper and or lower back pain



Q12 Asked respondents to categorize the pain on a level of one to five.

Figure 4.18 shows over 40% percent of respondents rated the pain as three. Close to 5% of respondents rated the pain as 5 unbearable pain. 65% of respondents rated the pain to be 3-5. This is subjective information but still informative.

Fig 4.18

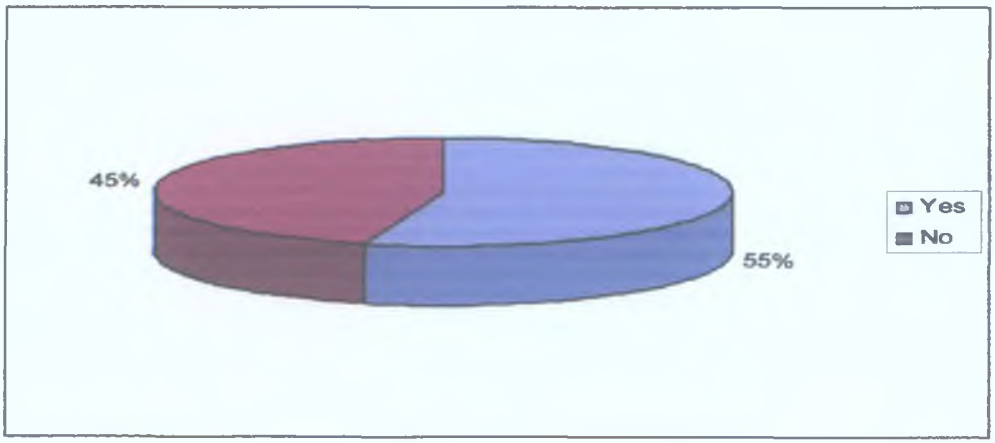


Q 13 (a) asked was medical treatment sought for the complaint

Figure 4.19 shows that 55 % of respondents sought medical help for their injury.

Figure 4.19

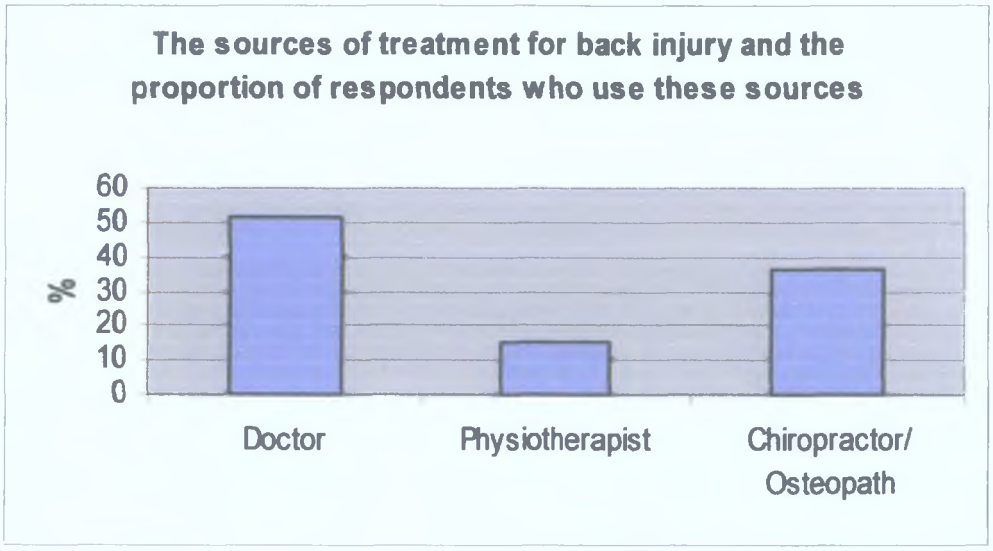
Proportion of respondents who sought medical treatment for the back pain



Q13(b) asked respondents to indicate where treatment was sought.

Figure 4.20 shows that the doctor was the main contact when respondents developed back pain. Over 50% of respondents seeking help visited the doctor to receive treatment for the back pain. 15% visited the physiotherapist and a further 35% visited the chiropractor. Many respondents ticked more than one box.

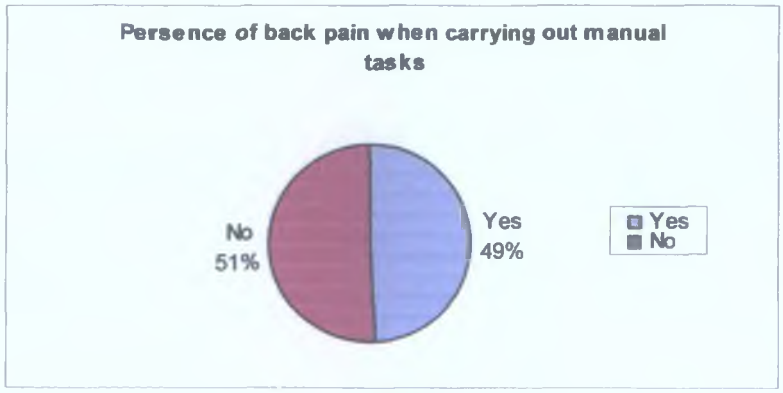
Figure 4.20



Question 14. asked if back pain is currently experienced when carrying out manual handling tasks

Figure 2.21 shows that 51 % of respondents with back pain experience it when carrying out farming tasks

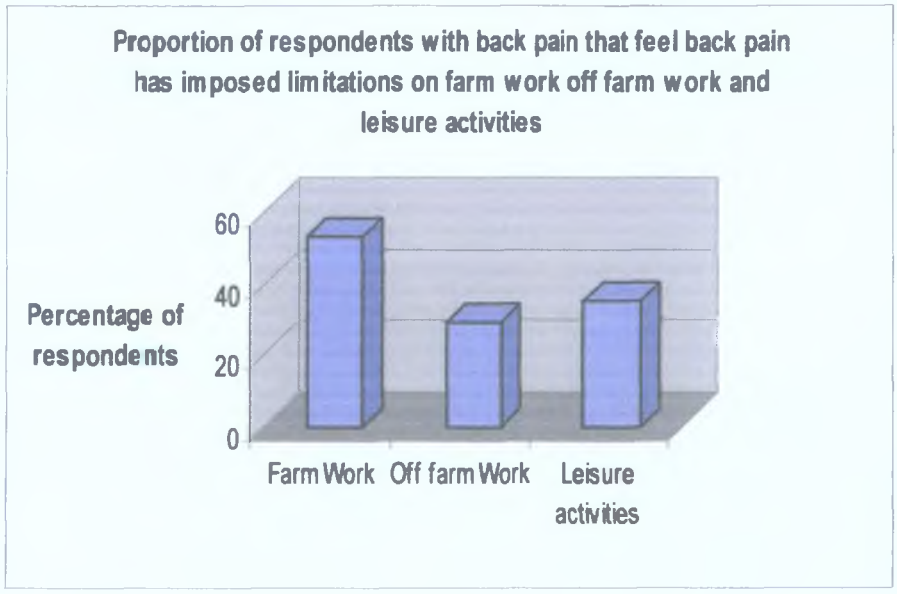
Figure 4.21



Question 15. asked if the back pain caused discomfort during farm work, off farm work and/or leisure activities.

Figure 4.22 shows that close to 50% of respondents with back pain believe that back pain has imposed limitations on farm work 20% said it imposed limitations on off farm work and a further 25% said it imposed limitations on leisure activities. Again many respondents reported that the three categories were affected by back pain

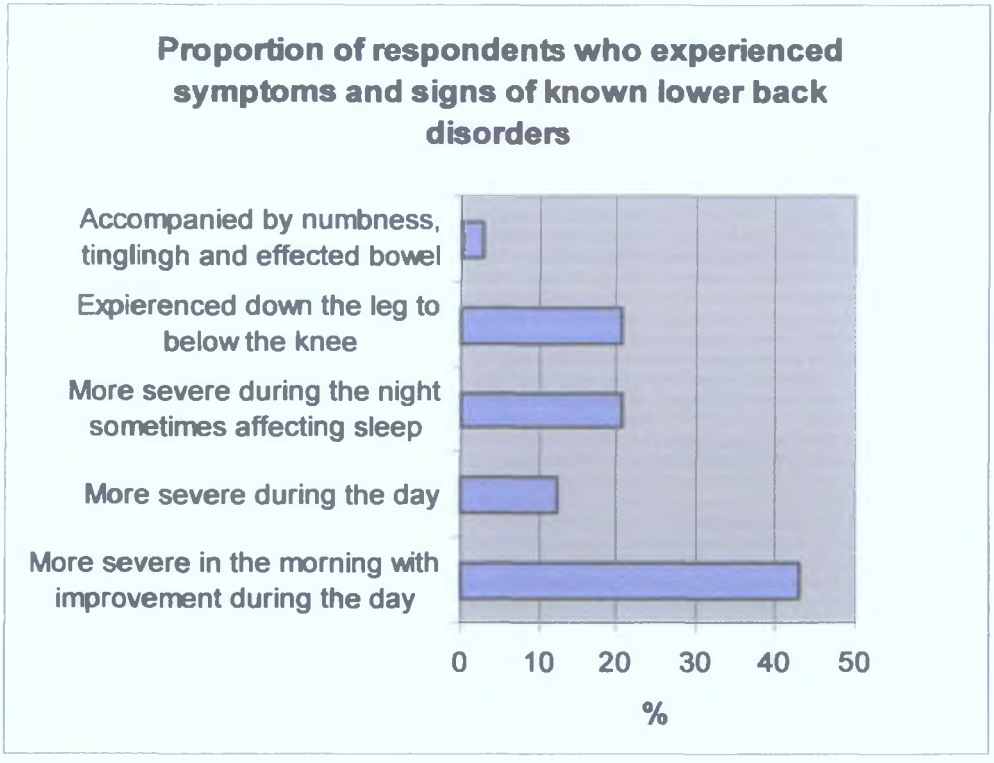
Fig 4.22



Question 16. asked respondents to indicate the type of back pain experienced by classifying it by its signs and symptoms into inflammation ,mechanical, infection, sciatica and/or Claudia equine syndrome as detailed in (levy and Wegman 2002).

Of the respondents with back pain 40% of respondents said that their pain was more severe in the morning with improvement during the day (inflammation). Close to 20 % said pain was experienced down the leg to below the knee (Sciatica), 20% said the pain was more severe during the night sometimes affecting sleep (infection), 10% said it was more severe during the day (mechanical) and finally 5% of respondents said the pain was accompanied by numbness tingling and affected bowel movement (Claudia equine syndrome).

Figure 4.23

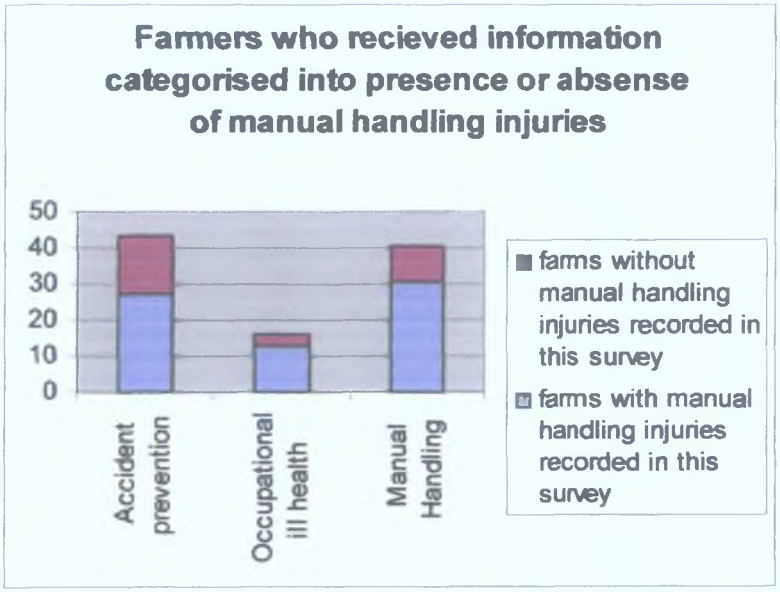


4.1.4 Advice and training in manual handling

Question 17 (a) asked respondents to indicate the types of information they have received on health and safety issues.

Figure 4.24 shows that over 40% of respondents reported to have received information on accident prevention. 17% of respondents reported received information on occupational ill health and 40% reported receiving information on manual handling. Despite receiving this information 25% of respondents who received information on accident prevention and 30% of the respondents who received information on manual handling reported that a manual handling injury had occurred on their farm.

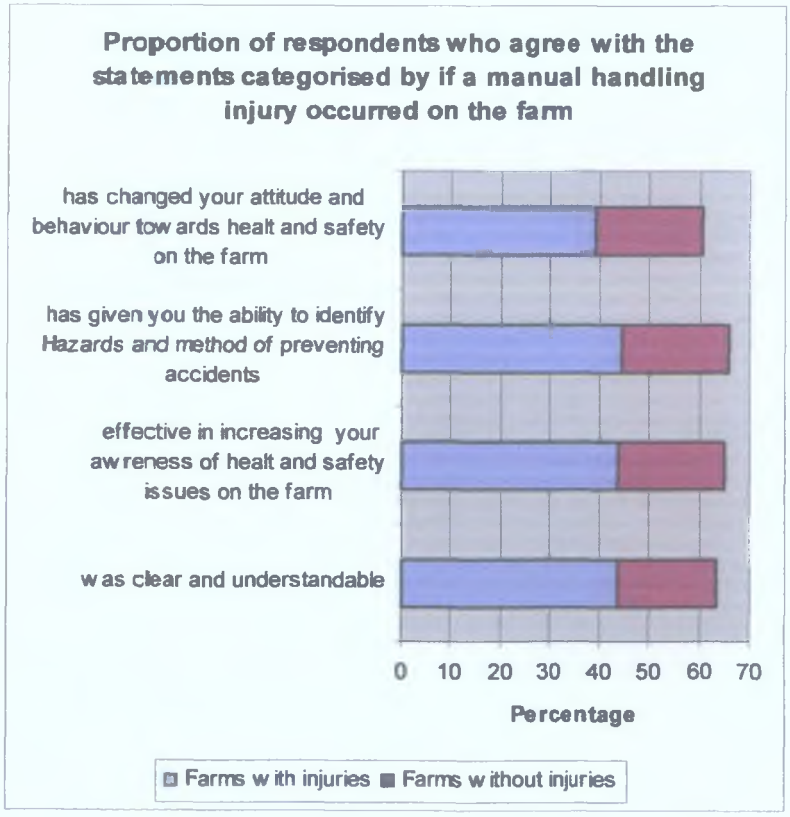
Figure 4.24



Question 17(b) asked respondents to indicate the value of the information provided.

Figure 4.25 shows that over 60% of respondents believed that the information has positively changed their attitude and behaviour towards safety on the farm. 40% of these respondents reported a manual handling injury on their farm. When asked if it has given them the ability to identify hazards and methods of preventing accidents 65% of respondents said yes but 45% of these reported that a manual handling injury had occurred on their farm. When asked if it was effective in increasing their awareness of health and safety issues on the farm 65% said yes while 44% of these reported a manual handling injury. Lastly when asked if they thought it was clear and understandable 63% said yes while 43% reported a manual handling injury in this survey.

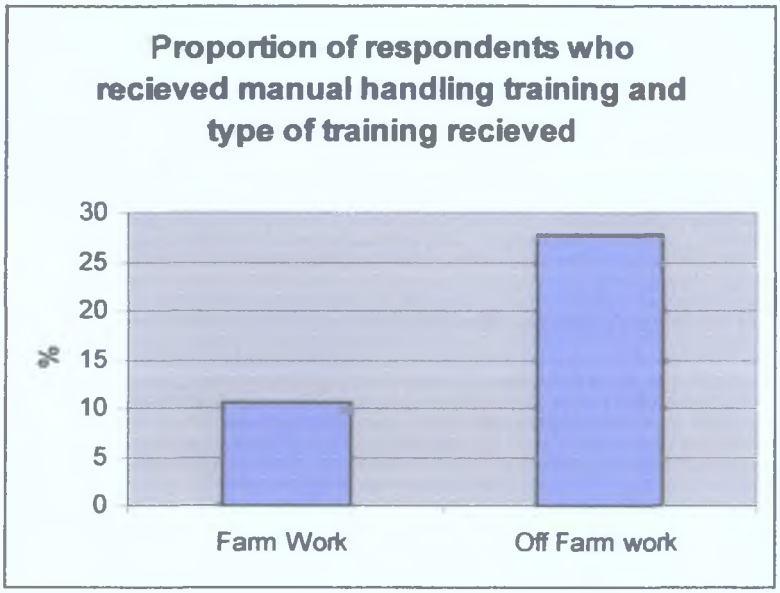
Figure 4.25



Question 18 asked if manual handling training was received was it specific to farm work or off farm work.

Figure 4.26 shows that 10% of respondents received training specific to farm tasks and 27 % received training to specific off farm work

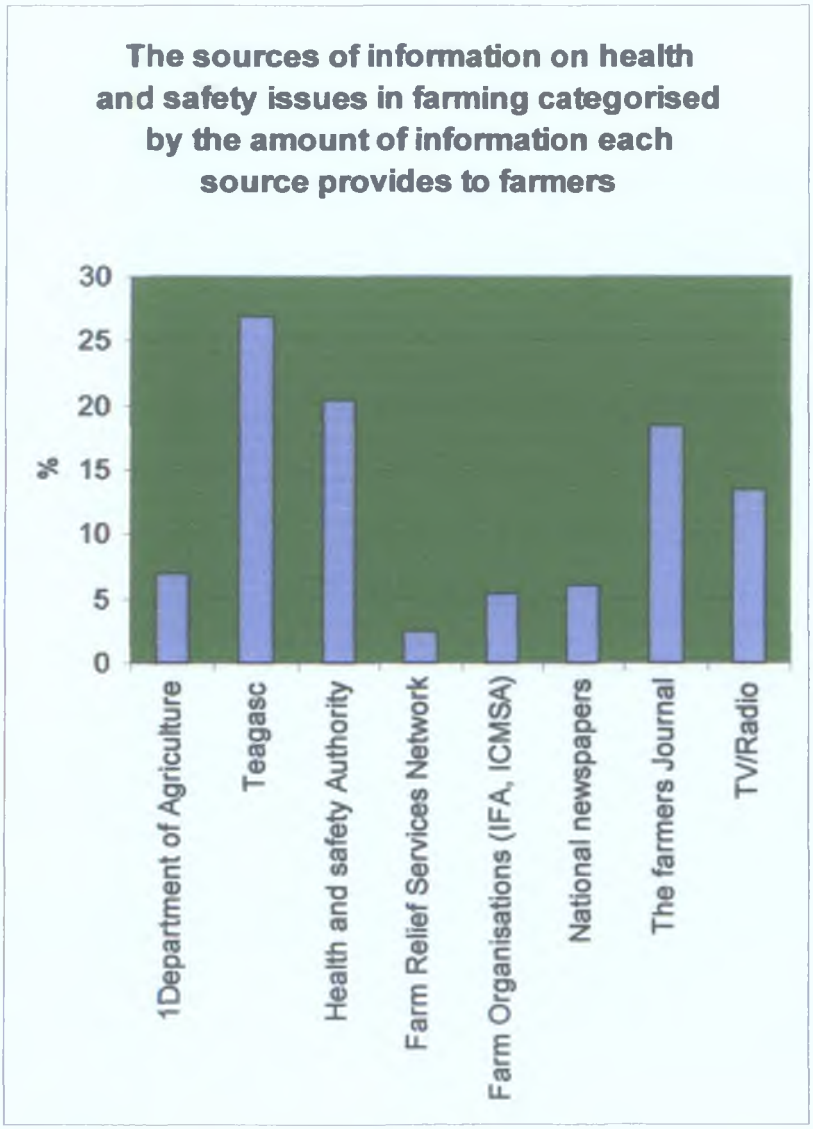
Figure 4.26



Question 19 asked respondents to indicate the source of most information on health and safety issues.

In figure 4.27 the main sources of information on health and safety issues are illustrated. 27% of respondents believe they receive most information and guidance from Teagasc. The health and safety authority is second with 20 % of farmers receiving most of their guidance and information from them. The farmer's journal was quoted by 18% of farmers. Only five percent of farmers reported to have received information on health and safety issues from farmer representative bodies like the IFA.

Figure 4.27



4.1.5 Purchasing policy for the farm

Question 20 (a) asked when purchasing items for the farm in what form is the major proportion of (a) concentrates, (b) fertiliser and (c) machinery are purchased

Figure 4.28 shows that 82% of respondents said they use the 25kg bag of concentrate. The main reasons given were due to its convenience, ease of use and handling.

Fig 4.28

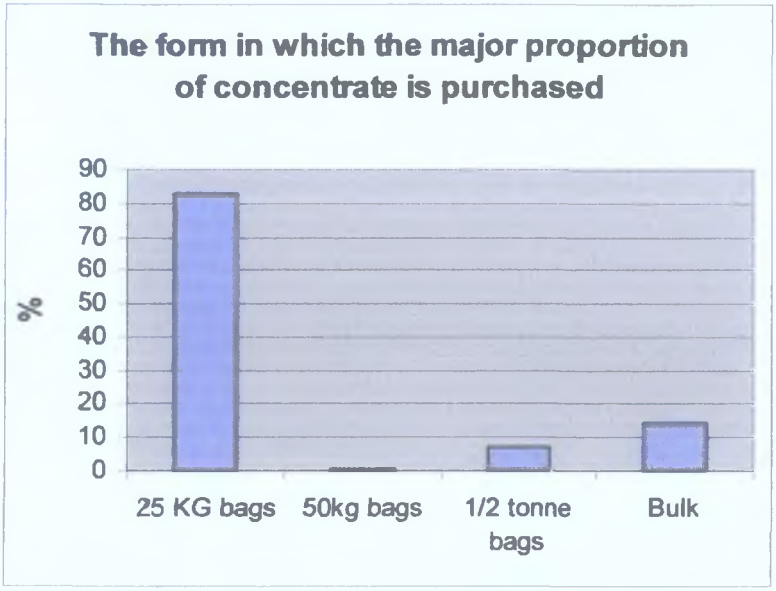


Figure 4.29 shows that 75% of respondents purchase their fertilizer in the 50kg Kg version. The main reasons given were small amounts spread no equipment to handle larger bags and the fact that nothing smaller is available.

Fig 4.29

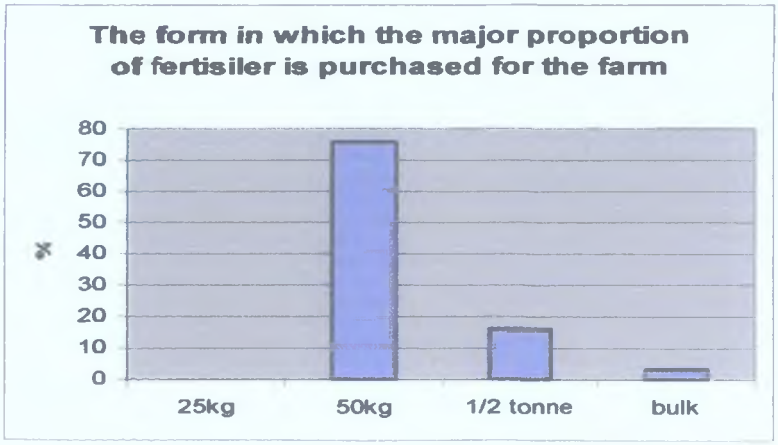
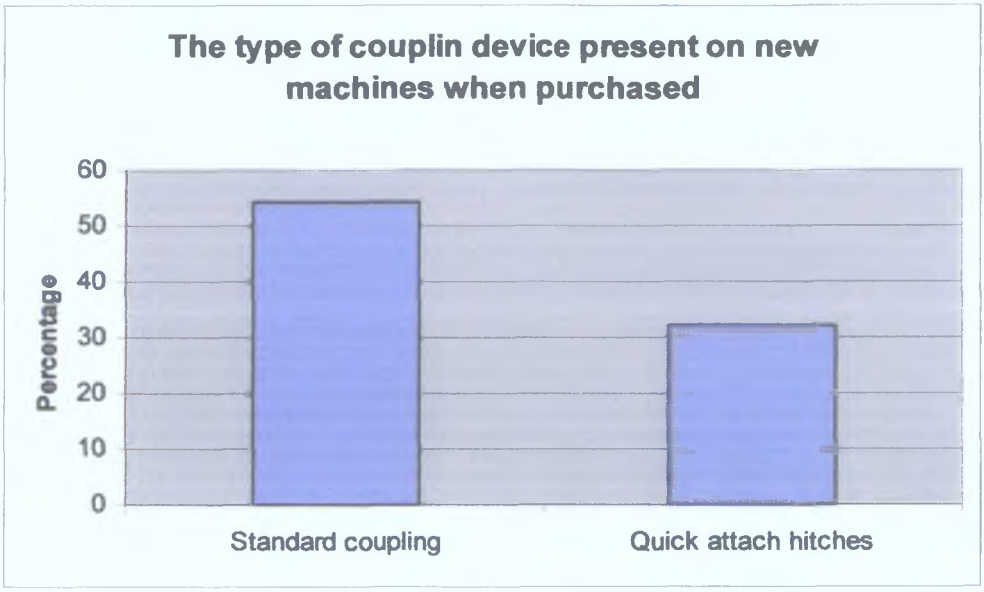


Figure 4.30 shows that 55% of farmers purchase machinery with standard methods of coupling. The reasons given for this were price of alternatives older tractors and compatibility with tractors.

Figure 4.30

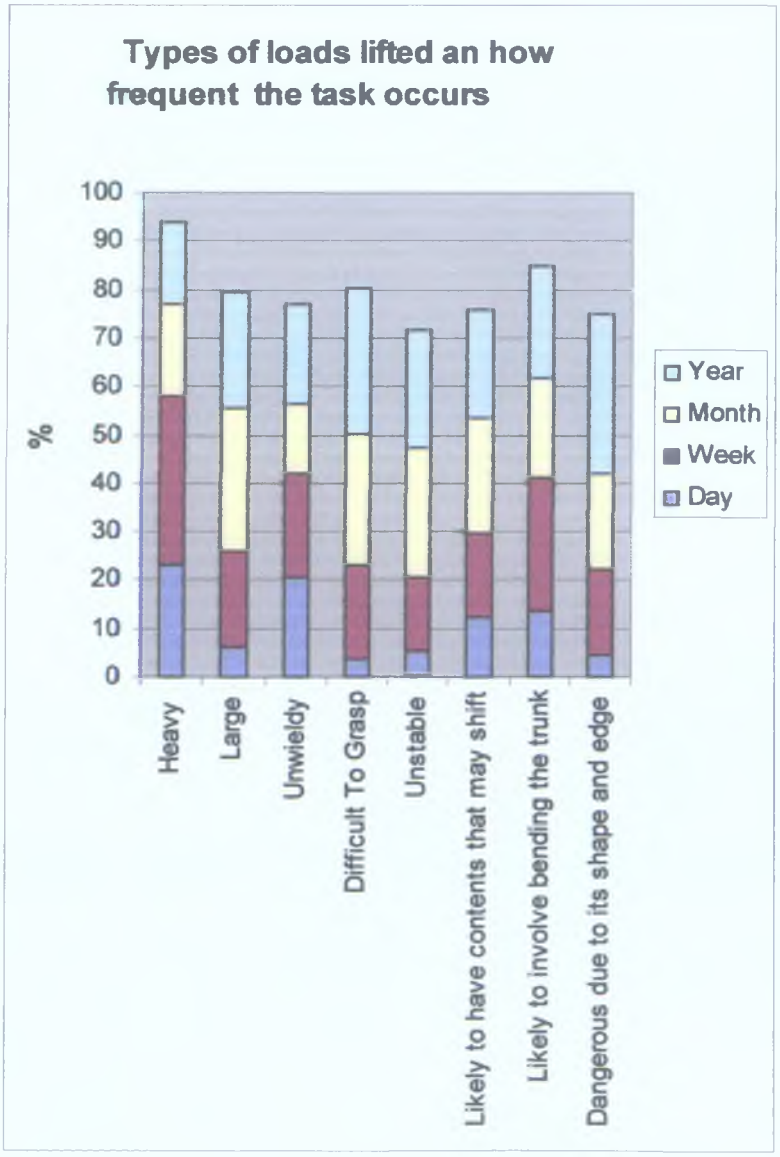


4.1.6 Manual handling checklist

Question 21 Asked the respondent to indicate the type of loads lifted and also the frequency that these types of loads are lifted.

As can be seen close to 90% of respondents lift heavy loads close to 60% of respondents say the perform tasks that involve heavy lifting several times weekly. 80% of respondents said that they lifted large objects several times during the year. Over 40% of respondents said that they lifted items that involved bending the trunk several times weekly.

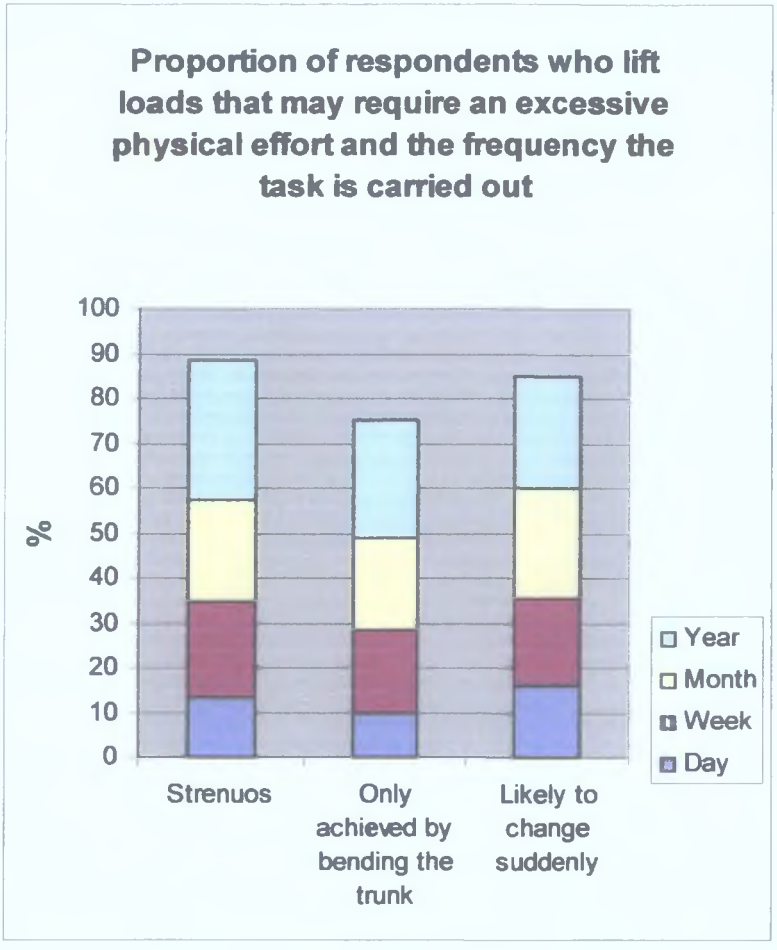
Figure 4.31



Question 22. asked respondents to indicate if they lift loads that require a physical effort and if they do how often.

Figure 4.32 shows that close to 60% of respondents perform tasks that are strenuous several times monthly. 50% of respondents said they performed tasks that require lifting loads, which could only be achieved by bending the trunk. Finally 60% of respondents said they perform tasks that have loads that are likely to change suddenly.

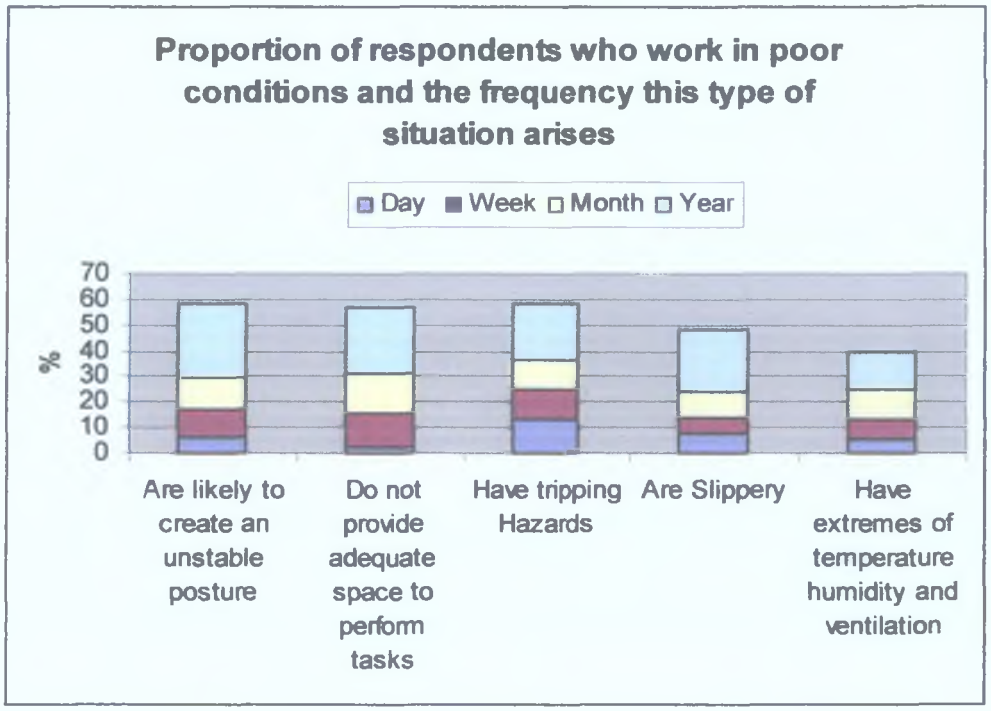
Fig 4.32



Question 23. asked respondents to indicate how frequently the work in different types of conditions.

Figure 4.33 shows that 30% of respondents work in conditions that are likely to create an unstable posture. Close to 60% of respondents said that they work in conditions that do not provide adequate space to perform the task required and have tripping hazards. 15% of respondents report working in conditions that are slippery and a further 15% in conditions with extremes of temperature humidity and ventilation..

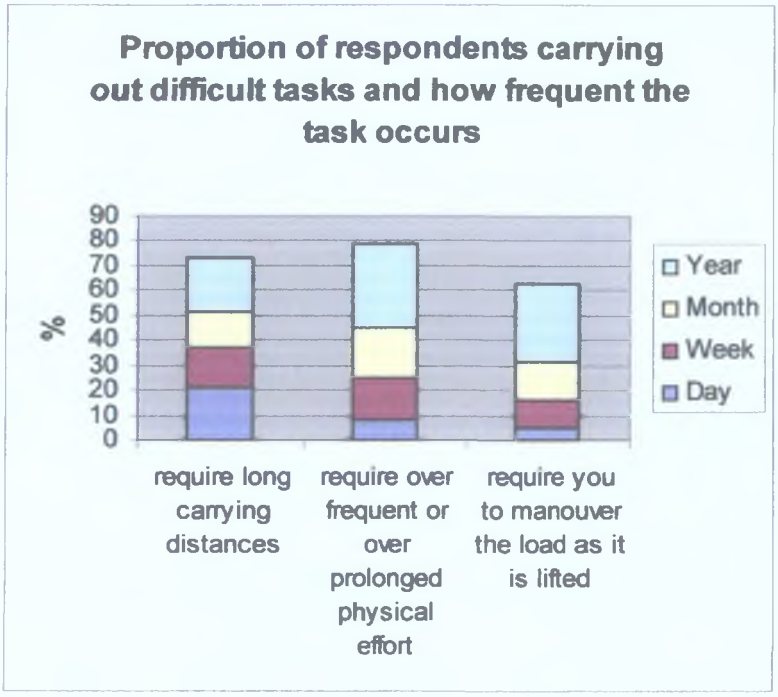
Figure 4.33



Question 24 asked respondents to indicate the frequency they perform specific tasks.

Figure 4.34 shows that over 50% of respondents said that they carry items over long distances several times monthly. 20% of respondents said that they perform tasks that require over prolonged or over frequent effort. 30% of respondents claimed to perform tasks that require them to manoeuvre the load as it is lifted.

Figure 4.34



4.1.7 Equipment that helps to reduce manual handling injury

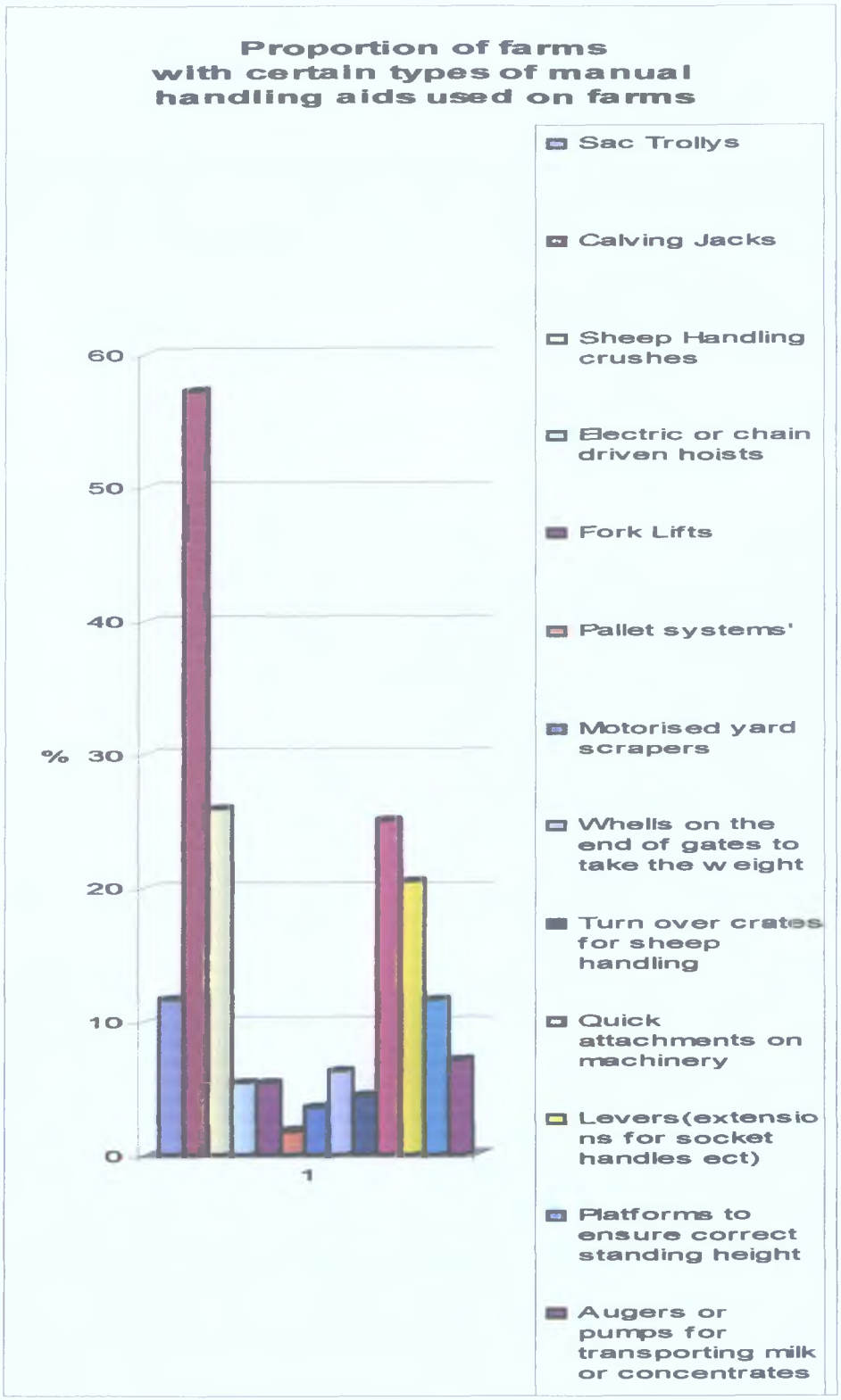
Question 25(a) asked the respondent to select from a list any equipment that they use on their farm.

Figure 4.35 shows the proportion of farmers with different types of manual handling mechanical aids. Of the 112 respondents 55% have a calving jack.

Only about 5% use a hoist or a forklift on their farm

Less than 2% pallet systems on their farms. Only 20% said they used levers. 10 % of said the use platforms to ensure correct working height. Augers or pumps are used by about 7% of respondents.

Figure 4.35


Proportion of farms with certain types of manual handling aids used on farms
60
50
40
30
20
10
0
%
1
Sac Trollys
Calving Jacks
Sheep Handling crushes
Electric or chain driven hoists
Fork Lifts
Pallet systems'
Motorised yard scrapers
Wheels on the end of gates to take the w eight
Turn over crates for sheep handling
Quick attachments on machinery
Levers(extensio ns for socket handles ect)
Platforms to ensure correct standing height
Augers or pumps for transporting milk or concentrates

Question 25 (b) asked respondents to identify any other equipment that may help to reduce manual handling.

There were only 2 suggestions provided

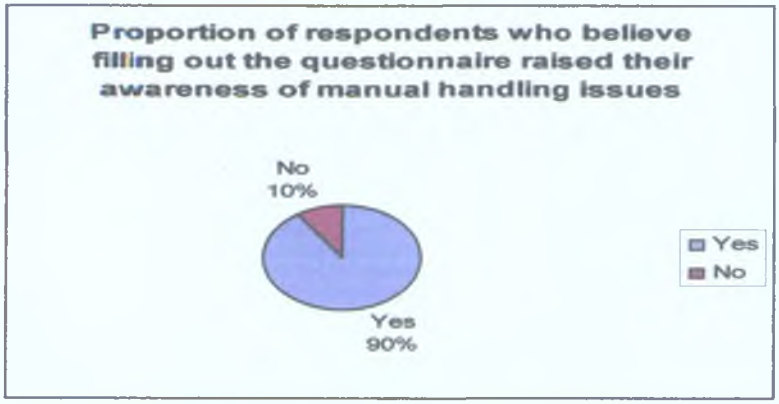
1. To use a digger
2. Ensure gates are hanging properly and secure

4.1.8 Investigation of farmer awareness of manual handling

Question 26 asked respondent do they believe completing this questionnaire has raised their awareness of manual handling issues

Figure 4.36 shows that of the 112 respondents 90% felt completing the questionnaire had raised their level of awareness of manual handling problems.

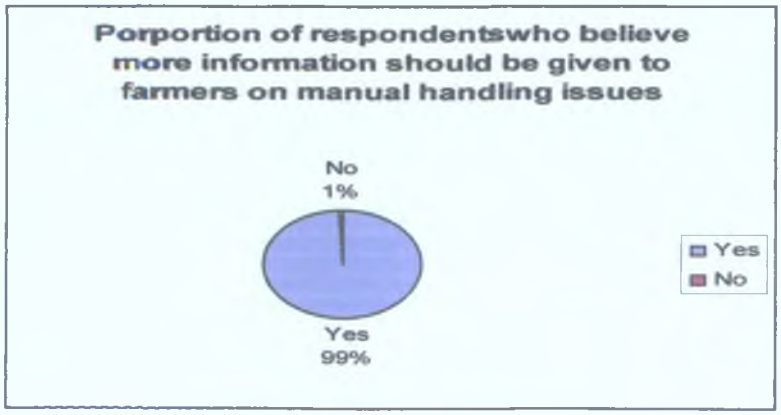
Figure 4.36



Question 27. Do you feel more information should be given to farmers on manual handling?

Figure 4.37 shows that of the 112 respondents 99% believe that more information should be provided for farmers on manual handling issues.

Figure 4.37



5. Discussion

To gain a better incite into the types of farming systems practiced in the sample area respondents were asked to select the type of farming system or systems they practiced. The suckler cow system followed by mixed suckler and sheep systems accounted for 25% and just fewer than 20% of the farming systems in the sample area. Close to 60% of respondents operating suckler cow farms reported to have experienced a manual handling injury. Over 60% of farmers operating a mixed suckler and sheep farm reported manual handling injuries had occurred on their farm (figure 4.1 b).

When all the various systems are combined it was found that of the 112 respondents 72 (65%) reported that a manual handling injury had occurred on their farm. This is a very high value and must receive further investigation to assess if the problem is truly this severe. It may be argued that many of the respondents returned their questionnaire because they had incurred a manual handling injury, which would influence the results of this study. Investigation of this theory is beyond the scope of this study but must be mentioned at this stage.

Farm size is shown to be a major factor in the presence of manual handling injury and back pain. Figure 4.2 shows the average farm size of respondents in the sample area was 25-50ha with close to 60 % of respondents falling into this category. This is similar to the national average of 33.6 ha (Frawley, 2002). 20% of respondents in this category reported that a manual handling injury had occurred on their farm. In the 10-20 ha category 10% of respondents reported a manual handling injury in this survey. The frequency of manual handling injury is shown to increase with farm size. A possible explanation for this may be that farmers with larger farms are forced to work longer and harder and must undertake physically demanding tasks more often.

There is a definite trend of a higher proportion of respondents with injuries as age increases (figure 4.4). Those with reported injuries due to manual handling rise from 19% of respondents in the 30-40 years age group to 22% of respondents in the >50 years age group. On a national scale 13% of farmers are under 35 and 40% are over

55 years. (DAF, 2005). Due to the large proportion of farmers over 55 years the likelihood of manual handling problems is thus high.

When age is excluded it is found that 65% of main farm operators experienced injury due to manual handling. If this was extrapolated out on a national scale with 130000 farmers (DAF, 2005) at 65% one could expect to find that over 78,000 farmers have suffered a manual handling injury but the vast range of farming systems and sizes would influence this. As farmers become more aware of the signs, symptoms and causes of these injuries it would not be surprising if injury rates were found to have increased in a follow up study.

Labour input into the farm will determine how much help and support the main farm operator receives while undertaking their daily tasks. As shown in figure 4.3 75% of respondents were married. Figure 4.5 shows that the farmer's spouse and children over 18 years are the main source of help on the farm. In most instances their help will only be requested when needed. The jobs that the farmer seeks help for are usually of a nature that the farmer cannot easily complete themselves and are thus likely to involve a high level of physical effort skill and knowledge. People participating in farm activities need to be trained and aware of the hazards that are present and the procedures that must be used to prevent injury. In Table 4.1(a) coupling the car trailer to the car and dosing cattle were two tasks that frequently resulted in injury among the respondents. The risk of injury when coupling a car trailer to a car may be reduced with the use of a jockey wheel but help and assistance when reversing in as well as with the pulling and lifting required while coupling the trailer is priceless. Assistance when holding and medicating cattle allows more control and reduces the likelihood of reaching or over lifting. As shown in Figure 4.3 main farm operators who were married reported more manual handling injuries then their single colleagues. This is surprising as it would be expected that more help would be available on these farms but Figure 4.8 shows that 43% of main farm operator's spouses are engaged in off farm employment. This is much higher than the national average of 24.8% in 2002. (Teagasc, 2002). This means the availability of help to perform farm tasks is poor with close to half spouses engaged in off farm employment.

A striking feature in recent years was the dramatic reduction in input from spouses to the day to day running of the farm. During the 1990s, a total of 24,000 spouses had disengaged from farming, a drop of 32%. There was also a significant decline in the contribution of other family members to the running of farms (Frawley, 2002). A further reduction in these values would be expected to have occurred in recent years. "It is clear from these trends that farming is becoming less family orientated and more a one-person operation on the majority of Irish farms", (Frawley 2002).

Off farm work is an increasing reality on Irish farms. The national average for main farm operators was 34% in 2002. Teagasc (2002). Figure 4.6 illustrates that 50% percent of respondents claimed to be engaged in off farm work in this study. This is increase may be due to the fact that the Irish economy has been buoyant since 2002 which resulted in increasing numbers of suitable well paid jobs pulling farmers into off farm work. This is helped along by the push factors of increasing living costs and reducing margins on many farms that push farmers into off farm work.

When the respondents with no off farm employment are investigated 75% of this group reported that a manual handling injury occurred on their farm. This is surprising as it shows farmers who work off farm are less likely to incur a manual handling injury. One explanation for this may be that most farmers are involved in manual type labour when working off farm and this exposes them to information and training in manual handling, thus they are more aware of the hazards. Almost 30% of farmers with off-farm employment were involved in the construction industry. A further 28% were involved in farm-related employment, such as machinery contracting and the provision of farm relief services (Frawley, 2002).

Figure 4.26 shows that 37% of farmers reported to have received manual handling training. 27 % of respondents reported receiving training that was specific to off farm work. Another explanation may be due to off farm income; the farmer has more free cash to spend on the farm this allows the farmer to purchase machines and equipment to allow tasks to be completed faster with the added bonus of reducing the need for manual handling. In 2000, it is estimated that €1 billion - €1.3 billion (£0.8 billion - £1 billion) was earned by farmers and their spouses from off-farm employment"

(Frawley, 2002). It could be expected that this number would have increased substantially since, due to Irelands strong economy and low unemployment figures.

Farmers who work off farm may hold full time jobs or part time work. Figure 4.7 illustrates that of those working off farm, 55% of respondents were working off farm full time with the remaining 45% working part time. As shown in figure 4.7, farmers who work off farm full time are at higher risk of incurring a manual handling injury then their colleagues who work off farm part time. Farmers, who hold full time off farm jobs, are severely restricted in their ability to find sufficient time to perform their farming tasks.

The time when injuries occurred to the main farm operator are illustrated in Figure 4.13. Of those respondents who reported a specific time 30% said their injury occurred in the morning from 6am-12pm. This is not surprising as it is not unusual for farmers to rise from bed and go directly to check livestock many still in the process of waking up especially those with off farm employment. The body needs time in the morning to wake up and reach its full potential. Exercise and stretching are good methods of speeding up the process. Many early morning tasks may be rushed due to time constraints and injury may occur. We see another peak in the 6-12 pm time bracket. Again many farmers working off farm will be returning home at this time. The farm work will then have to be completed before they can rest. Farmers on full time farms will be tiring after a long day and thus an increase in injury rates at this time is not surprising. The many risk factors associated with manual handling and farm work coupled with the physically exhausting working hours and time constraints mean farmers who work off farm full time are at a very high risk of getting injured or developing a musculoskeletal disorder due to manual handling.

Injury due to collective strains was given as the reason for injury by 30% of respondents while lifting was the reason given by 32% (Figure 4.10). Cumulative strains and injuries due to lifting are the two most frequent causes of injuries in farmers. Many farmers indicated that pushing, pulling, slip /trip/ fall, lifting and cumulative injury were each collectively to blame for the injury. This highlights the complex nature of manual handling injuries and the ability to reduce them. While many farmers identified specific injuries and causes many injuries arise without

warning and it is virtually impossible to pinpoint the specific cause. Farmers are forced to perform strenuous physically demanding tasks multiple times during the day thus it is not surprising that cumulative strains was reported by many farmers to be the cause of injury.

When day to day tasks of a typical farmer are investigated it is easy to see why manual handling is such a problem. Figure 4.28 shows that 82% of respondents said they use the 25kg bags of concentrate when feeding their animals. The main reasons given were due to its convenience, ease of use and handling. Some alternatives would be the ½ tonne bags or bulk. This however leads to an increased dependency on machinery and many farmers buying concentrate in these forms still transfer it to the 25kg bags when feeding. Carrying a 25kg bag of meal is a physically demanding exercise even for a short time. Farmers must be made aware of the risk of overfilling and of excessive reaching when emptying.

Another task commonly performed by farmers is spreading fertiliser. Figure 4.29 shows that 75% of respondents purchase their fertilizer in the 50kg bag. This is worrying from a manual handling point of view. The lifting of the 50kg bag is a strenuous physically demanding task, which usually involves twisting and reaching to get it into the fertilizer spreader. The 25kg bag replaced the 50kg version of the cement bag in 2002. The forestry industry uses the 25kg bags of fertilizer. Most respondents in the study reported that they used the 50kg bags because they did not have the machinery to handle larger bags and because there was nothing smaller available. As about 550,000 tonnes of fertiliser were spread on Irish soil in 2004 the numbers of people subjected to this task are large. Larger farms in tillage areas or dairy areas would have the necessary machines to allow for bulk and ½ tonne bags to be used but many tonnes are still spread using 50kg bags. Farmers and their representative bodies must pressurize the fertilizer manufacturers and those packaging it to reduce the bag size to 25kg for those who wish to purchase it.

On a broader scale Figure 4.31 shows that 95% of respondents said they lift heavy loads close to 80% of respondents say the perform tasks that involve heavy lifting and over 85% of respondents said that they lifted items that involved bending the trunk. The frequency with which these types of tasks are carried out are also displayed. 20%

of respondents reported to lift items that are unwieldy several times each day. 20% of respondents reported to lift items that were unstable several times each week. From the data it is obvious that the risk factors, which can result in manual handling injury, are present and occur frequently. Use of excessive force can lead to fatigue and if sustained, to injury either through a single event, strain injury or through the cumulative effect of repeated use of force (Sesto, 2002). 62% of farmers report to have experienced back pain. This high value is expected when we look at the frequency certain loads are lifted by a high percentage of farmers.

The environmental conditions that farmers are exposed to are sometimes extreme which has an effect on manual handling injuries. As shown in Figure 4.33, 58% of respondents work in conditions that are likely to create an unstable posture several times during the year. Close to 60% of respondents said that they work in conditions that do not provide adequate space to perform the task. 45% of respondents reported working in conditions that are slippery and a further 40% in conditions with extremes of temperature humidity and ventilation several times during the year.

Poor working conditions increase the risk of injury and also require more complex methods of reducing their frequency. The task of taking back the cover on a silage pit in the rain for example is a much more difficult and dangerous task, requiring more caution and preparation than if conditions are dry. Working in a cold milking parlour on a frosty morning can place additional demands on the body as well as the need to wear warm clothing and gloves, which can mean extra force is required when gripping. Cold conditions can also result in decreased blood flow, sensation and dexterity and increased muscle activity.

The conditions that manual handling injuries recorded in this study occurred are shown in figure 4.11 for the main farm operator. Of those who could remember the weather conditions when a specific manual handling injury occurred (40 respondents) 45% said it took place in dry conditions while 35 % of respondents reported their injuries occurred in wet weather. Most farmers will try to conduct manual handling tasks in dry weather so 35% of injuries occurring in wet weather show increased risk when conditions are wet.

Farming life constantly exposes the farmer to difficult tasks. Figure 4.34 shows that over 50% of respondents said that they carry items over long distances several times during a month. Over 80% of respondents said that they perform tasks that require over prolonged or over frequent effort several times during the year. 30% of respondents said they perform tasks that require them to manoeuvre the load as it is lifted several times each month. When the duration of the task is long and it requires a high level of physical effort there may be insufficient time for recovery and injury may occur. (Bobick and Meyers, 1994) Every effort must be made to reduce to a minimum the effort and duration required to carry out a task, providing adequate rest breaks when required is one method.

To obtain a better understanding of the type of tasks that caused manual handling injury to the farmer respondents were asked to detail the type of task they were carrying out when a known manual handling injury occurred. Tables 4.1 (a-f) shows the vast range of tasks that resulted in injury. While some tasks are only represented by a single respondent reporting that an injury had occurred when carrying out the task, the risk of manual handling injury is easily identified. Some of the tasks, which affected a number of respondents, were attaching a car trailer to a car which accounting for injury among 6 respondents. Dosing cattle, calving cows and filling fertiliser spreader using 50kg bags were also common tasks causing injury with 5 respondents each reporting that they had been injured while carrying out these tasks. Some of the tasks reported by the respondents occur daily on many farms thus the potential for injuries among a large group of people are large. A study investigating these and the identification of the countless other tasks that may cause injury together with hazard identification and risk assessment would provide invaluable information to anyone trying to develop a programme to reduce manual handling injury among farmers.

One of the major flaws in this research was the omission of a question asking respondents if they needed to take time away from the farm when injured as well as a question asking if they reported the injury to the HSA. This would allow analysis of what was reported in this study and what was reported to the HSA. Another important question asking why they reported or failed to report the injury was omitted and must be included in any further study in this area.

The types of manual handling injuries affecting main farm operators and the proportion of respondents affected by these injuries are illustrated in figure 4.12. 30% of respondents reported strains to be the type of injury affecting them. 20 % of respondents reported sprains with a further 20% reporting slipped discs to be the main injury incurred.

In this survey 62% of farmers reported to have suffered from back pain with 40% claiming they have suffered it in the last 12 months. This is similar to the findings of Magee (2002) in her social study of farmers in northern Ireland which found 40% of farmers in the north of Ireland suffer from back pain and also similar to the findings of the 2002 national farm survey which found that 49% of farmers suffer chronic back pain.

Farming exposes many body parts to the risk of manual handling Table 4.3 shows the principal areas of the body affected by manual handling injuries. Over 62% of respondents reported that lower back pain with a further 2.5% in the upper back to be affected by the manual handling injury. The ankles, knees and hips were reported by 6.6%, 5.5% and 11% respectively. % Of respondents respectively to be affected by manual handling injuries. This is similar to the findings of Bobic and Myers, (1994) who found back pain in the shoulders arms and hands were the most common symptoms reported by farmers. The fact that the body parts other than the back are so poorly reported shows the level of awareness among farmers of manual handling. I t would be expected that injuries to body parts other than the back would be higher than the values presented in this study. Interviews would help to gain a better insight and allow a more truthful reflection of reality. These results provide evidence of a problem but extensive research would need to be done to define its true extent.

The lower back must be given special emphasis in any manual handling training or information program given to farmers, as it is the location of injury among 60% of Irish farmers. Figure 4.15 shows that close to 80% of respondents believed general farm work was the main cause of their back injury. With 10% and 13% believing it was leisure activities and off farm work respectively. This illustrates the fact that manual handling injuries suffered by farmers are generally caused by farm work and

thus the solutions to the problem must be specific to the problems as they exist in agriculture and not generalised from other industries.

The chronic nature of back pain among the respondents is shown in figure 4.16, 15% of respondents said they had experienced back pain in the week prior to completing the questionnaire. 64% of respondents reporting they had experienced back pain within 12 months of completing the questionnaire. This is a worrying percentage and shows the difficulty that back pain is causing among the farming community and its chronic nature. The back pain may be chronic due to farmer's poor awareness of the risk of working while injured, inadequate rest, poor awareness of methods of promoting recovery or lack of ability to remove the risks of it reoccurring.

When asked to categorize the pain on a level of one to five over 40% of respondents rated the pain as three. Close to 5% of respondents rated the pain as 5 unbearable pains. 65% of respondents rated the pain to be 3-5. Back pain ratings of three and above would be disabling and cause severe discomfort. This information provides evidence of the severity of the problem and the urgent need for intervention.

The pain was of sufficient severity and caused sufficient discomfort that 54% of respondents sought medical help for their injury as shown in Figure 4.19. The doctor was the main contact when respondents developed back pain. Over 50% of respondents seeking help visited the doctor to receive treatment for the back pain. 15% visited the physiotherapist and a further 35% visited the chiropractor as shown in Figure 4.20. It is obvious that farmers seek referrals to specialists for help, which means the costs of treatment would be substantial. These people have very influential roles and may provide a reactive program of providing information and support to farmers along with a proactive programme to prevent further problems. The promotion of safer manual handling could be included in advice given to farmers suffering from back pain. The doctor is highly respected in Ireland and advice provided by doctors is regularly followed this relationship between doctor and patient could be used by health promoters wishing to reduce manual handling injury by supplying information to the doctor who can pass it on to the farmer.

Many challenges exist for health care in providing preventative, diagnostic and counselling services in rural settings. As the needs of the patient and awareness increases related to musculoskeletal disorders, greater demands will be placed on rural health care providers. Therefore, it is essential that lessons learned from other industries in the area of occupational medicine be applied to agricultural issues (Mazza, 1997). Rural health care providers have a pivotal role in providing preventative counselling on musculoskeletal disorders at an individual and community level.

Back pain has a disabling influence on the farmer. Pain that affects work and leisure activities will lead to lower performance, absenteeism, stress and could affect the performance of the farm. Figure 4.22 shows that close to 50% of respondents with back pain believe that back pain has imposed limitations on farm work 20% said it imposed limitations on off farm work and a further 25% said it imposed limitations on leisure activities.

The red flags of lower back pain detailed in Levy and Wegman, (2002) were investigated and results are shown in Figure 4.23. Of the respondents with back pain 40% of respondents said that their pain was more severe in the morning with improvement during the day. This is a sign of mechanical injury to the back. Close to 20 % said pain was experienced down the leg to below the knee, which is a sign of sciatica. 20% said the pain was more severe during the night sometimes affecting sleep, which is a sign of infection. 10% said it was more severe during the day, which is a sign of inflammation and finally 5% of respondents said the pain was accompanied by numbness tingling and affected bowel movement, which is a sign of Claudia equine syndrome.

80 % of dairy farmers in this study reported a musculoskeletal disorder this is similar to the findings of Pinzki (2002) who found that 83% of male dairy farmers reported a manual handling injury. However the author questions the validity of the data in this study due to the fact that only 5 dairy farmers returned their questionnaire. Pinzki (2002) also found that dairy farmers found silage handling and the milking procedure were the most strenuous work operations. These two tasks were not recorded in this study possibly indicating that they are not as big a problem for Irish farmers. The

milking procedure would be expected to cause some problems due to the many manual handling risk factors present in the task such as reaching and repetition but silage handling in Ireland has become increasingly mechanised and thus many of the manual handling risk factors have been removed.

Lower et al, (1996) found that 60% of farmers reported that they experienced back trouble. 75% of farmers in this survey reported to have experienced back pain. Lower et al, (1996) also found that half experienced back trouble during the previous 10 years. In this study 15% of respondents reported to have experienced back pain during the past 5 years with a further 20% reporting to have experienced pain for more than 5 years. This shows that the incidence of back pain and is an indication of its chronic nature. In the CSO quarterly national household survey (2002) it was found that the arms legs and feet accounted for 15% of longstanding health problems. These results were mirrored in this study with 10% of respondents claiming to be injured in these areas due to manual handling injuries.

In the Teagasc national farm survey (2002) chronic back pain was found to affect 49% of farmers. This is also true in this study 49% of respondents said they currently experience back pain 50% said it imposed limitations on farm work a further 20% on off farm work and a further 30% on leisure activities. 65% of respondents in this survey rated the pain as 3-5, which indicates severe discomfort.

Bovei, et al (1999) reported that a substantial body of evidence to suggest that exposure to whole body vibration at the doses likely to be encountered by farmers driving tractors is associated with lower back pain. 2 farmers in this survey linked tractor driving to lower back pain and indicated it as the cause Klareskog and Kleinau, (1994) found farmers to have 30% greater risk of developing rheumatoid arthritis than other workers. Comparison of farmers with other workers was not made in this study but 20% of farmers reported to have arthritis.

Information training and advice are vital components of any campaign designed to promote awareness. Figure 4.24 shows that over 40% of respondents reported to have received information on accident prevention. 17% of respondents reported receiving information on occupational ill health and 40% reported receiving information on

manual handling. Despite receiving this information 25% of respondents who received information on accident prevention and 30% of the respondents who received information on manual handling reported that a manual handling injury had occurred on their farm. Figure 4.25 shows 60% of respondents believed that the information has positively changed their attitude and behaviour towards safety on the farm. 40% of these respondents reported a manual handling injury on their farm. When asked if it has given them the ability to identify hazards and methods of preventing accidents 65% of respondents said yes but 45% of these reported that a manual handling injury had occurred on their farm. When asked if it was effective in increasing their awareness of health and safety issues on the farm 65% said yes while 44% of these reported a manual handling injury. Lastly when asked if they thought it was clear and understandable 63% said yes while 43% reported a manual handling injury in this survey. The value of the information provided to farmers and its effectiveness in promoting a positive health and safety culture is questioned by the results displayed. Much of the information received by farmers is through the post with no personal contact. Research in the area of manual handling in agriculture is poor and thus the quality of the information provided to farmers in this area is poor.

The construction industry has a good record of reporting injuries, which are followed up by hazard identification and risk assessment to reduce the risk. This allows the most up to date information to be used when providing training and promoting awareness. One possible method of increasing penetration would be to provide education and training for department of agriculture officers in health and safety on farms. This could be transferred to farmers as advice while carrying out inspections for cross compliance and other farm visits.

In Figure 4.27 the main sources of information on health and safety issues are illustrated. 27% of respondents believe they receive most information and guidance from Teagasc. The fact that this study was carried out among Teagasc clients means there is a high possibility of bias in this result. Teagasc client farmers would naturally receive more information when they are under contract. This should mean that they are more informed and aware of health and safety issues. While Teagasc provides a very good service the availability of trained health and safety professionals to individual farmers is low. Teagasc would be ideally placed to provide information

and training in health and safety for farmers. The introduction of extra modules on health and safety in certain courses offered by Teagasc would certainly be a step in the right direction. Teagasc has expert knowledge and experience in the area of farming practice and in the development and provision of education and training for farmers. This knowledge and experience would provide a very strong base on which to begin building a safety culture in the agriculture sector. For this to be possible staff members would require training to allow for the most up to date information to pass to farmers.

The health and safety authority is second with 20 % of farmers receiving most of their guidance and information from them. The farmer's journal was quoted by 18% of farmers. What was surprising is the amount of information and support the IFA give farmers on health and safety issues. Only 5% of farmers reported to have received information on health and safety issues from farmer representative bodies like the IFA. The fact that these farmers were not asked if they were a member of IFA must be indicated at this stage. A survey of IFA members could provide different information. Representative bodies in other industries provide a large amount of information and support to their members on health and safety issues. Due to the severity of health and safety issues on Irish farms farmer representative bodies must increase their efforts.

The productivity and efficiency of many Irish farms has and is being put under pressure by many issues such as low output price increasingly higher input prices, but injuries also pose a threat to productivity, as an injured farmer unable to carry out their daily tasks will result in large productivity losses. Farmers who become injured will first need to pay their medical bill and then they may need to employ farm labour during their recovery period. The profits on these farms will thus suffer significantly. Farmer representative bodies must increase their efforts to positively influence the situation. Information booklets, codes of practice, information on old and new legislation and what must be done to comply together with names of people working in the area could be some supportive initiatives these organizations could provide for farmers.

Figure 4.30 shows that 55% of farmers purchase machinery with standard methods of coupling. The reasons given for this were price, older tractors and compatibility with tractors. Most new machines offer a choice of coupling. The tractor is not usually an issue as the quick attach mechanism will work on any tractor. Most manufacturers will provide the quick attach at no extra cost. The findings show that many respondents don't fully understand how the quick coupling work and the benefits it has. It helps to remove some of the risk of injury involved when trying to couple machines as the quick attach is designed to allow for attaching machines to the tractor from the tractor seat with only minor manual interaction such as positioning locking pins.

Mechanical aids are one method of reducing manual handling injury rates.
Figure 4.35 shows the proportion of farmers with different types of manual handling mechanical aids 55% of farmer's have a calving jack. Only about 5% of farmers use a hoist or a forklift on their farm. Less than 2% of farmers use pallet systems on their farms. Pallet systems are extensively used in other industries to move and store items. Pallets with feed could be taken off the trailer and placed where they are to be used thus removing the need to unload the lorries in one place and then move it to other areas. Only 20% of respondents said they used levers. Levers are very effective method of reducing loads and can be used for extending the length of a socket handle or for lifting lids. 10 % of farmers said the use platforms to ensure correct working height. Platforms are an extremely cheap method of reducing manual handling loads. They can be used when trimming hedges driving long stakes painting ect.
Augers or pumps are used by about 7% of respondents. They have the ability to remove the need to move concentrate or milk around the farm.

In spring on many dairy farms the movement of milk from the parlour to the calf shed is a regular occurrence happening usually twice a day. This is usually done using barrels but with some planning the milk could be pumped to the calves in a milk line direct from the parlour thus removing the need to manually transport it. Pumps and augers will only be suitable in individual situations and the capital cost may be prohibitive on some farms but its potential should not be overlooked

Figure 4.36 shows that 90% of respondents felt completing the questionnaire had raised their level of awareness of manual handling problems. This confirms the fact that farmers would benefit from additional information on manual handling.

Figure 4.37 shows that 99% of respondents believe that more information should be provided for farmers on manual handling issues. Many farmers believe their level of awareness of manual handling problems is low and more information and support would help to change this.

Table 4.1(a-f) provides interesting information for anyone trying to develop a campaign to reduce injuries in agriculture. Farmers were asked to describe specific tasks that were being carried out when a manual handling injury occurred. It was found that back injuries among 34 respondents involved farm machinery with a further 5 respondents reporting tasks involving farm machinery were being carried out when a non back injury occurred. Back injuries involving miscellaneous tasks affected 29 respondents and non back injury among 17 respondents. Back injuries involving animals affected 14 respondents said that they incurred a back injury while carrying out tasks involving animals with a further 15 receiving a non back related injury.

The tasks involving machinery that affected most respondents were attaching a trailer to car and long periods of tractor driving. The miscellaneous tasks with high risk of injury were fertilizer spreading taking back cover on pit and driving stakes. The tasks involving animals with the highest risk were dosing cattle, calving cows, shearing sheep and kicks.

The behaviour of farmers was also found to have an influence on the incidence of manual handling. Farmers who hold full time off farm jobs were found to be at a higher risk of having a manual handling injury than their colleagues who work off farm in a part time capacity. Full time farmers are unlikely to have excessive amounts of free time to allow them to carry out farm work without some degree of urgency. This pressurises the farmer to create an environment where every task rushed and after a long day working exhaustion may also play a role. 40% of farmers who work off farm received manual handling training but 72 % of the 55% who work off farm

reported a manual handling injury. This emphasises the point made by Donohue, (2002) a change in attitude frequently results in no change in behaviour if environmental pressures are strong enough.

Purswell et al (1993) stated that a major influence on ones behaviour is the behaviour of others with this observed or learned behaviour inherited without consideration given to appropriateness. This was found to be common to many of the tasks that resulted in injury. The techniques and skills used in animal husbandry are largely transferred from father to son. This can result in younger farmers picking up bad habits from their fathers or failure to be exposed to new techniques.

Modern agriculture has developed many methods of reducing the need for excessive manual handling. Calves can be debudded using an electric debudder before the calf is 2 weeks thus removing the hazardous physically demanding task of penning large 6-8 month old cattle to skull them. Injectible avermectin drugs are now available for the treatment of parasites in livestock and pour on solutions are also available for the treatment of worms in cattle where previously oral drugs were used. This can eliminate the dangerous task of drenching cattle orally. Dipping of sheep to control sheep fly strike and sheep scab is no longer necessary as injectables and pour on solutions have been developed to illuminate the need for this task.

Even shearing has not escaped. A breed of sheep known as Easy Care are the result of a successful breeding programme started in 1965 by North Wales farmer R. I. "Iolo" Owen. The aim was to produce a breed of sheep, which would require minimal shepherding, and veterinary care and yet offer excellent meat yields and lambing ratios. These sheep do not require shearing and as sheep shearing is a chore rather than a money making exercise in Ireland cross breeding these genes into breeds used in Ireland would help to remove the physically demanding task.

These husbandry techniques are slow to transfer to farmers as can be seen when we look at table 4.1 (e) which shows that 17 tasks involving animals resulted in back injury and a further 16 involving animals in non back related injury to farmers. Dosing cattle was reported five times and shearing sheep was reported 3 times as the cause of manual handling injury and dehorning (skulling) reported 2 times.

Sandell et al 1998 reported that Australian farmers sub consciously classified different occupational health and safety risks into risks involving a specific task rather than the broader type of action. Many of the farmers in this study that reported manual handling injury, confined the injury to a specific task. Lifting was not reported to be the cause of injury but putting the trailer on the car was. Many tasks were reported by farmers to be the cause of injury.

Reporting is a major problem that needs urgent attention in agriculture. Many efforts have been made to get farmers to report injuries and accidents to the HSA but have failed miserably so far. Farmers are largely self employed and are thus willing to work hard for their own benefit. Taking days of work to recover after an injury will only cause disruption on farms so many farmers force themselves to work while still injured. This situation would be less likely to occur in other sectors like construction and manufacturing due to the fact that workers when they get injured would be able to receive paid sick leave if required, they would be more likely to report the incident or accident, a medical examination would be carried out and appropiate time off work would be granted to allow recovery. Irish farmers are unlikely to have systems in place where they can claim sick leave, instead he or she would be responsible for selecting and paying a suitable replacement. This inconvience and cost means farmers will attempt to continue to work while injured and if they do need rest it will be for the shortest duration possible. Without adequate time for recovery exacerbation of the injury could occur.

Farmer's organizations could look into the merits of providing their members with incentives to report accidents or incidents. One method could be that if the farmer gets injured he goes to the doctor and gets examined if sick leave is required then a report of the injury and its causes could be sent to the HSA. In return for these reports the government could allow the costs of the doctor visit, replacement labour and or medication to be reclaimed in the form of tax credits. These reports would provide information that would enhance the value of information provided to farmers and help reduce injury rates. Without sufficient information on injury rates, types of injuries, causes of injuries, risk factors associated with certain tasks and procedures used by farmers to reduce the risk of injuries the success of any campaign may lack the thoroughness required to bring about change.

6. Recommendations for resolving manual handling problems

Manual handling should be approached in a systematic way. The method, required under Irish legislation is to

1. Identify the hazards,
2. Assess the risk they pose,
3. Control the risks by either removing the hazards entirely, isolating them, or
4. Minimising the risk it poses.

Hazard identification

The manner of identifying hazards should show both a proactive and reactive approach. Proactive methods are safety inspections, the observation of tasks and the application of ergonomic principles to the design of equipment and facilities.
For example, one of the main hazards faced by farmers is simply stooping down to pick up items. The use of shelves and stands may reduce this. Reactive methods include the farmer investigating the causes of discomfort, recording hazards in their safety statement to identify existing and potential problems. Farmers need to be made aware of hazards and possible methods of removing, avoiding or minimising them.

Actions and movements

Actions should be performed smoothly and without using extreme ranges of joint movement, avoiding reaching, bending and twisting.
Examples of where this factor may be violated include: opening heavy gates, changing tractor tyres, putting on car trailers which were the tasks been performed when 2, 1, and 6 farmers respectively got injured.

Workplace design or layout

The position and design of equipment should allow the farmer to: adopt an upright, forward-facing postures, see the task easily, and perform tasks at about waist height. Examples of where this factor might be violated include: Milking the cows, filling a fertiliser spreader, mounting a vacuum tankers suction hose on the transport supports, Other examples are: narrow aisles in storage spaces, and low benches requiring bending. As can be seen in figure 4.34 60% of farmers reported to work in poor conditions several times during the year. Some foresight and planning when

designing the building would help to reduce this. Planning to perform strenuous tasks during dry weather and if possible when help is available.

Duration and frequency of manual handling

The duration and frequency of manual handling tasks bear a relationship to an increased risk of injury. The duration and frequency of the task should be minimised An example of this would be the feeding of meals to cattle this task may need to be done twice a day and depending on the numbers involved may take a considerable amount of time. The task should be assessed and possible solutions such as fitting troughs in positions that is easily accessed and will not need to be moved each day. Ensuring that there are sufficient numbers of troughs for the animals. When milking rest breaks must be made part of the routine when tractor driving rest breaks and exercise must be used.

Location of loads and distances moved

As a general rule, manual handling, especially when repeated, should be performed between the mid thigh and the shoulders. Every effort must be made to locate materials in places where they can be easily accessed and as close as possible to where they are to be used.

Examples of where this factor might be violated include: reaching for animal medicines on a high shelf, or heavy equipment on a low shelf. Placement of machines must be planned to allow adequate height and stability when detaching and attaching.

Loads and forces

As the weight of a load rises, so does the risk of injury, with a threshold of 16kg standing and 4.5kg sitting signalling a rise in the likelihood of an injury (HSE 2005). Application of force in handling apart from lifting: dragging, pushing and restraining needs to be considered too.

Examples of where this factor might be violated include: handling heavy animals, over-filling meal bags, and the method of filling and dragging them. It is a good idea for each farm to own a sack trolley or wheelbarrow to reduce the load when carrying.

Characteristics of loads and equipment

Loads exhibit many different features, which may add to the risk of the handling required: size, shape, texture, temperature, rigidity, stability, ease of gripping, slipperiness, sharp edges and an absence of hand grips are examples.

Examples of where this factor might be violated include: handling slippery animals, fitting transport boxes to tractors, removing twines from round bales, opening and closing gates that are not hung properly, changing a wheel on a tractor, maintenance of cattle feeding barriers, drilling holes in walls, milking out cows with mastitis, pairing feet.

Work organisation

This refers to the time pressure of work and the number of people able to do it. Apart from these obvious factors, multiple tasks, long, maintenance and the reporting of hazardous conditions are relevant here. Rest breaks should be used to provide adequate relief every effort must be made to source skilled labour as and when required as money saved by undertaking strenuous tasks alone may quickly be lost if injury occurs.

Poor environmental conditions (lighting, heat and humidity, noise, vibration, flooring, yards, housekeeping) may add to the general load on a farmer or may contribute directly to an incident.

Examples of poor conditions include: wet or slippery floors, holes in concrete sharp edges on walls gates, cold draughts in workshops.

Skills and experience

Farmers need knowledge about health and safety issues of manual handling and training in how to perform tasks to minimise the risk of injury.

Examples of where this factor might be violated include:

Inadequate assessment of the loads, development of risk controls and poor lifting techniques, which can ultimately lead to injury.

Design and redesign

Ideally, plant and equipment for use in agriculture should be designed safe from the outset. Farmers shall take all practicable steps to ensure that plant used by any

employee and themselves is so arranged, designed, made and maintained that it is safe. Enforcement agencies must ensure its safe and hold designers accountable. Designers need guidance and education to design for human use through application of ergonomics.

Special needs

Special methods of risk control may be required in particular situations, for example: farmers returning from an absence or holiday, farmers with disabilities, farmers who are pregnant or recovering from an operation or an injury.

Risk control

To reduce risks of manual handling, the following hierarchy of controls should be applied, in order of priority:

1. DESIGN
2. REDESIGN
3. MANUAL HANDLING AIDS
4. EDUCATION

EXAMPLES

- Design new or modify old facilities so that the minimum amount of manual handling is required to carry out the task i.e. use of manual handling aids
- Training individual and team lifting techniques.
- knowledge about the back and what can go wrong with it.
- Alter storage to prevent reaching above mid thigh or above the shoulder.
- Modify the object
- Remove the need for handling, or change the object handled to make it less of a burden.
- For example: change from using 50kg bags of fertiliser to using bulk bags which are lowered mechanically but ensure that the new practice does not create new hazards like the bulk bag falling.

Modify the workplace design

Change the farmyard, tools, equipment and the space the work is done in to eliminate undesirable postures, actions and movements.

For example: remove high and low shelves, alter layout of doors to allow freedom of movement. Eliminate as far as possible bending, twisting, reaching movements and static postures.

Resolving manual handling problems

Modify the task with mechanical assistance. Lifting hoists to aid the transfer of materials, milk pumps to transfer milk to calves without using buckets or barrels. There is sometimes the possibility of using mechanical assistance to ease the burden of handle objects. Trolleys, wheelbarrows, quad bikes and attachments even efficient use of the tractor can help. Farmers must pressurise producers and designers of agricultural goods to take the farmer into consideration as well as the merits of the machine. Designers need to be educated about ergonomics and the impact their designs have on their users. Designers should be also held accountable for their designs.

Manual handling aids

Use, bars, poles, hand blocks, lifting belts, lifting hoists, etc. whenever possible.

Education and training

Training packages, which have traditionally emphasised "how to lift", need broadening to include hazard identification, risk assessment and risk control. Education for knowledge and training for skill acquisition are essential. Training will need to be ongoing, as skills need updating. Trainers must be encouraged to have a very broad appreciation of all the issues of a manual handling campaign and have indebt knowledge of farming practices.

There are several challenges there is often no single, correct way for a particular lift. Common sense dictates that the knees bent/straight back technique is preferred. With this method, however, a number of problems can still arise, depending on the circumstances:

- The knee function may be at a disadvantage for some lifts/transfers.
- There may be increased strain on the shoulders, upper spine and arms.
- Lifting over the knees can be a problem.

- The stance may be awkward, leading to a slip or a trip.
- It can't always be used.
- Trainers need to educate people in how to think about their activities rather than just follow rules.
- People forget they need refresher training in the best of circumstances,
- Training at the education facility does not transfer to the farm or the milking parlour.
- Each Farm or milking parlour has its own special demands due to the particular nature of the work, and local conditions.

7. Conclusion

It is evident from the findings of this thesis that manual handling and back pain affects many farmers. 65% of farmers reported a manual handling injury occurred on their farm with 62% reporting to have experienced back pain.

It is also evident that risk factors associated with manual handling and MSD's are commonplace in agricultural tasks. This study showed the vast range of tasks that the injured person believed was the cause of their injury. While many of these tasks could be modified to allow the elimination, avoidance or minimisation of the need for manual handling, would require considerable research to identify the countless tasks that have a risk of manual handling injury and develop methods of reducing the risk.

However, there remain a large number of manual handling tasks, which are unlikely to be completely eliminated. As 65% of respondents reported to have received a manual handling injury there is a very high possibility that these injuries were not properly treated and work continued while injured. This means they can be reactivated at any time so training in how to reduce risks (through good working practices) and proper manual handling technique remains important.

In agriculture, risk can be reduced through better design of products, equipment and buildings. These solutions, often developed by farmers, need to be brought to the attention of manufacturers and suppliers. Those people who experience injury know the risk and many will develop their own controls to prevent it happening again but this knowledge, confined to the individual farmer must be accessed and used to improve awareness among other farmers. If reporting of injuries were increased it would help to allow the most hazardous tasks to be identified first and controls developed.

It can be seen that the HSA and other stakeholders in the area of farm safety must increase efforts to increase injury reporting among farmers and the promotion of health and safety on farms. 99% of farmers said that they would like to receive more information on manual handling which suggests that farmers believe they are not receiving the support they require.

For solutions to be developed

a) Farmers and health and safety professionals 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. (Petit, 2004)

c) Suppliers and manufacturers need to receive more information and training on ergonomics so they can design more user friendly machines and products.

d) The stakeholders in agricultural safety must increase their efforts and develop policies to promote injury reporting among farmers.

e) This study provides evidence that manual handling is a problem among the agricultural sector. The evidence is however largely subjective and open to discussion. A study of manual handling, carried out by people from a medical background would provide more concrete evidence.

f) Case studies of farmers with back pain or manual handling injuries would also provide information on the causes of the injury and what effects it has had on the daily life of the farmer and his family.

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FIGURES

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Diagramme for spine
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Diagramme of sciatic nerve
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Appendix 1. Survey Questionnaire

Francis Bligh,
Environmental Science Department,
IT Sligo,
Ballinode,
Co.Sligo.

Email address **s00044112@itsligo.ie**

Mobile No. (086) 4071260

16th March 2005.

Dear Sir /Madam

I am a native of County Roscommon and am currently undertaking my Masters in Environmental, Health and Safety Management at the Institute of Technology, Sligo of which a significant part of this course takes the form of a research thesis.

The area I have chosen to research is manual handling and back related injuries among the Farming Community in County Roscommon. Manual handling is a very serious issue as one third of all injuries are due to poor manual handling practices. Manual handling has been extensively researched in industrial circles but it has received very little attention in agriculture.

Manual Handling is the physical movement by a person of objects by lifting, pushing, pulling, carrying or moving, that is likely to cause injury.

The enclosed questionnaire is completely confidential. Teagasc Roscommon has kindly facilitated me by forwarding the questionnaire to you and many more of their clients.

This questionnaire is a major part of my research and I would be extremely grateful if you could complete and return it as soon as you can preferably before Friday the 15th of April.

The questionnaire should take less than 10 min to complete.

I enclose a **stamped addressed envelope** for your convenience.

I am very grateful for your time, effort and co-operation in filling out the questionnaire.

Yours sincerely,
Francis Bligh

SURVEY QUESTIONNAIRE

SURVEY OF MANUAL HANDLING INJURIES AND BACK PAIN AMONG FARMERS

(Alterations in font size and format were carried out to allow for inclusion in this thesis)

1. Farming system? (Please tick as appropriate)
Dairy □ Beef □ Suckler □ Sheep □ Pigs □ Tillage □
Other

2. Farming size (Ha) as per Area Aid return?
<10 □ 10-20 □ 20-50 □ 50-80 □ >80 □

3. Martial status of main farm operator? Single □ Married □

4. (a) Age group? < 30 □ 30-40 □ 40-50 □ 50-60 □ >60 □
(b) Gender Male □ Female □

5. People who participate in farming activities on the farm?
Spouse □ offspring (<18yrs) □ offspring (>18yrs) □ Relative □ Paid Labour □ Contractor □

6. (a) Does the main farm operator engage in off farm employment? Yes □ No □
(If yes) Part time □ Full Time □

(b)Does spouse engage in off farm employment? Yes □ No □ Not applicable □
(If yes) Part time □ Full Time □

MANUAL HANDLING INJURIES

7. Please indicate if any of the following people working on the farm have suffered a manual handling injury by indicating the principle cause of the injury.

(If no please proceed to question 9.)

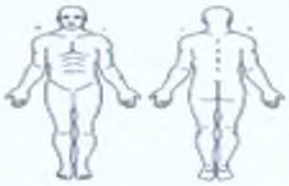
Title	Pushing	Pulling	Lifting	Slip/trip/fall	Injury due to the collective strains of various tasks over time	What was being done when the injury occurred
Main operator	□	□	□	□	□	
Spouse	□	□	□	□	□	
Relative	□	□	□	□	□	
Children	□	□	□	□	□	
Paid Labour	□	□	□	□	□	
Contractor	□	□	□	□	□	
Other (please specify) _____	□	□	□	□	□	

8. Please indicate on the table below the type of weather when the injury occurred, the type of injury suffered and the time of day.

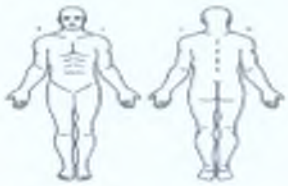
	The conditions when the injury occurred			
Title	Dry	icy	wet	windy
Main operator	□	□	□	□
Spouse	□	□	□	□
Relative	□	□	□	□
Children	□	□	□	□
Paid Labour	□	□	□	□
Contractor	□	□	□	□
Other ;	□	□	□	□

Description of principal injury of body part							Time of day when injury occurred
Strain	Sprain	Break/ Fracture	Slipped disc	Bruising	Arthritis	Other	
□	□	□	□	□	□		
□	□	□	□	□	□		
□	□	□	□	□	□		
□	□	□	□	□	□		
□	□	□	□	□	□		
□	□	□	□	□	□		
□	□	□	□	□	□		

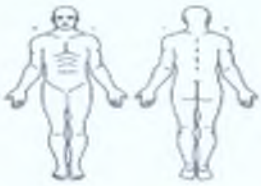
8. Please circle body parts affected and give the title of the person affected.



Title: Main Farm Operator_____



Title_____



Title_____

BACK PAIN

9. Has the main farm operator suffered from back pain? Yes □ No □
(*If no please proceed to question 17*)

10. Was the pain initially caused by?
General farm work Yes □ No □
Off farm work Yes □ No □
Leisure activities Yes □ No □

11. (a) Was back pain experienced in the past?
week □ month □ 6months □ 12 months □ 5 years □ >5 years □

(b) Where in the back was the pain experienced Upper back □ Lower back □

12. How would you rate the pain on a level of 1 to 5, (1 ache - 5 unbearable)?
1□ 2 □ 3□ 4 □ 5 □

13. (a)Was medical treatment sought for the back complaint? Yes □ No □

(b) If yes please indicate where treatment was sought
Doctor Yes □ No □
Physiotherapist Yes □ No □
Chiropractor/Osteopath Yes □ No □
Others (please specify)_____

14. Is back pain currently experienced when carrying out manual handling tasks? Yes □ No □

15. Does the pain impose limitations or cause discomfort during?
(a) Farm work Yes □ No □
(b) Off farm work Yes □ No □
(C) Leisure activities Yes □ No □

16. Have you experienced back pain that was in the past or is currently?
(a) more severe in the morning with improvement during the day? (Inflammation) Yes □ No □
(b) more severe during the day? (Mechanical) Yes □ No □
(c) more severe at night sometimes affecting sleep? (Infection) Yes □ No □
(d) experienced down the leg to below the knee? (sciatica) Yes □ No □
(e) accompanied by numbness, tingling, and has effected bowel movement Yes □ No □

ADVICE AND TRAINING ON MANUAL HANDLING

17 (a). Please indicate if you have received information on?

Accident prevention ☐ Occupational ill health ☐ Manual handling ☐

(b) If yes do you believe it?

(a) was clear and understandable Yes ☐ No ☐

(b) effective in increasing your awareness of health and safety issues on the farm Yes ☐ No ☐

(c) has given you the ability to identify hazards and methods of preventing accidents Yes ☐ No ☐

(d) has changed your attitude and behaviour towards health and safety on the farm Yes ☐ No ☐

18. Have you received manual handling training that is specific to?

(a) Farm work Yes ☐ No ☐ (b) Off farm work Yes ☐ No ☐

19. Please indicate where you receive most information and advice on health and safety issues?

1. Department of Agriculture Yes ☐ No ☐
2. Teagasc Yes ☐ No ☐
3. Health and Safety Authority Yes ☐ No ☐
4. Farm Relief Services network Yes ☐ No ☐
5. Farm organisations (IFA, ICMSA) Yes ☐ No ☐
6. National newspapers Yes ☐ No ☐
7. The Farmers Journal Yes ☐ No ☐
8. TV/ Radio Yes ☐ No ☐
9. Other (please specify)_____

PURCHASING POLICY FOR THE FARM

20. When purchasing items for the farm in what form is the major proportion of the following goods purchased (Please tick one from each if applicable)

(a) (i) Concentrates

25kg bags ☐ ½ tonne ☐ Bulk ☐ Reason_____

(ii) If purchased in half tonne bags or bulk what method is used to distribute the concentrate to the animals.(25kg bags, buckets)

_____

(b) Fertiliser

50kg bags ☐ ½ tonne ☐ Reason_____

(c)Tractors and machinery

Machinery with standard method of coupling ☐ Quick attach hitches ☐

Reason_____

Please complete the following manual handling checklist for your farm.
(Please use the given examples as prompts
there are <u>many</u> other examples for each type of task.)

Task	Example of the task	On average, over a year do you perform this type of task several times a			
1. Do you lift loads that are?		**Day**	**Week**	**Month**	**Year**
(a) heavy	Bags of feed, fertiliser, gates,	☐	☐	☐	☐
(b) large	Loading doors on trailers, gates	☐	☐	☐	☐
(c) unwieldy	Buckets of water, milk cans	☐	☐	☐	☐
(d) difficult to grasp	Newborn calves, machine parts,	☐	☐	☐	☐
(e) unstable	Roles of piping, wire, sheets of steel	☐	☐	☐	☐
(f) likely to have contents that may shi	Wheelbarrow	☐	☐	☐	☐
(g) likely to involve bending or twisting the trunk.	Livestock handling (dosing, pairing),shovelling, yard scraping	☐	☐	☐	☐
(h) dangerous due to its shape and edg	Machinery, handling steel, fencing	☐	☐	☐	☐
2. Do you lift loads that uire a physical effort that is?	**Example**	**Day**	**Week**	**Month**	**Year**
(a) strenuous	Assisting calving, opening gates	☐	☐	☐	☐
only achieved by bending the trunk	Operating rear mounted machines	☐	☐	☐	☐
(c) likely to change suddenly	Livestock husbandry tasks	☐	☐	☐	☐
3. Do you work in conditions that	**Example**	**Day**	**Week**	**Month**	**Year**
(a) are likely to create an unstable posture	Low doors, low piping in the milking parlour cramped cabs	☐	☐	☐	☐
(b) do not provide adequate space to perform tasks	Small calving pens, workshops, storage sheds, inside machines	☐	☐	☐	☐
(c) have tripping hazards	Cracked floors, stones, bedding	☐	☐	☐	☐
(d) are slippery	Smooth concrete, steep slopes	☐	☐	☐	☐
(e) have extremes of temperature humidity and ventilation	Poorly ventilated sheds, pig houses Machine cabs.	☐	☐	☐	☐
24.Do you perform tasks that that?	**Example**	**Day**	**Week**	**Month**	**Year**
(a) require long carrying distances	Feeding concentrates from a bag	☐	☐	☐	☐
(b) require over frequent or over-prolonged physical effort	Shearing sheep, tractor driving for long periods.	☐	☐	☐	☐
© require you to manoeuvre the as it is lifted	Holding a cluster while inserting the cups, coupling machinery,	☐	☐	☐	☐

EQUIPMENT THAT HELPS TO REDUCE MANUAL HANDLING

25(a) Please indicate if any of the following equipment is used on the farm

(a) Sack trolleys ☐ (g) Wheels on the end of gates to take the weight ☐
(b) Calving jacks ☐ (h) Turn over crates for sheep handling ☐
(c) Sheep handling crushes ☐ (i) Quick attach systems on machinery ☐
(d) Electric or chain driven hoists ☐ (j) Levers (extensions for socket handles ect). ☐
(e) Fork lifts, pallet systems ☐ (k) Platforms to ensure correct standing height ☐
(f) Motorised yard scrapers ☐ (l) Augers or pumps for transporting milk, meal ect ☐

(b) Please detail (on overleaf) any other examples you believe should be included in the above list.

26. Do you believe completing this questionnaire has raised your awareness of manual handling issues Yes ☐ No ☐

27. Do you feel more information should be given to farmers on manual handling? Yes ☐ No ☐

Appendix 2 Manual Handling Regulations

Part VI of the Safety Health and Welfare at Work (General Application) Regulations deals with manual handling. These regulations were introduced to reduce the large incidence of injury and ill-health arising from the manual handling of loads at work.

The main structure of the regulations is as set out below:

Regulation 27 Interpretation for Part VI

In this part, "**manual handling of loads**" means any transporting or supporting of a load by one or more employees, and includes lifting, putting down, pushing, pulling carrying or moving a load, which by reason of its characteristics or unfavorable ergonomic conditions, involves risk, particularly of back injury, to employees.

This definition of manual handling refers to unfavourable ergonomic conditions.

The unfavourable ergonomic conditions are detailed as reference factors in the Eight Schedule of SI 44 of 1993.

Regulation 28 Duties of Employer (Farmer):

(a) take appropriate organisational measures, or use the appropriate means, in particular mechanical equipment, to avoid the need for manual handling of loads by employees.

(b) where the need for the manual handling of loads cannot be avoided, take appropriate organisational measures, use appropriate means or provide his employees with such means in order to reduce the risk involved in the manual handling of such loads having regard to the factors specified in the Eight Schedule to the Regulations

(c) wherever the manual handling of loads cannot be avoided, organise workstations in such a way as to make such handling as safe and health as possible, and:

- assess the health and safety conditions of the type of work involved, and in particular examine the characteristics of the loads, having regard to the factors in the Eight Schedule, and;

- take care to avoid or reduce the risk, particularly of back injury, to his employees, by taking appropriate measures, considering in particular the characteristics of the load, the physical effort required, the characteristics of the working environment and the requirements of the activity, taking account of the factors for the manual handling of loads specified in the Eight Schedule

(d) without prejudice to the provisions of Regulation 11, ensure that those of his employees who are involved in manual handling of loads receive general indications and, where possible, precise information on the weights of each load and the centre of gravity of the heaviest side when a package is eccentrically loaded.

Manual handling risk assessment

The Manual Handling regulations set out a framework for employers to avoid or reduce manual handling activity. Employers must assess the risk associated with their manual handling operations and take steps to:

- avoid or reduce the risk of injury;
- increase understanding of a manual handling task;
- identify if there are risk factors present;
- explore the options or solutions that are available to avoid or reduce the risks;
- put a plan in place to introduce the agreed solution.

It should be carried out in consultation with employees or the safety representative.

Appendix 3 Innovations and handling aids

Petit (2004)

Below is a list of some ideas and solutions to manual handling problems

Walk through the pens on a regular basis, which allows the animals to get used to their handlers.

Sticks to the same procedure when entering the bull pens so that they to get used to the routine

Lightweight clusters are advantageous to the cow and the operator

Using a spanner to turn the power take off (PTO) shaft in order to unwind a blocked baler or addition of extensions on transport hooks on vacuum tankers to lowewr the height required to lift suction hose to put on transport hooks. Agricultural engineers must be aware of many such problem solvers

Many special features on gates, including one that allow them to open on to sloping ground by offsetting the position of the bottom or top hanger.

Use of Quad bike to aid carrying

Efficient use of tractor and loader modify doors feeders so that they can be moved using the tractor.