Farm Child UK
Part I
A report on the nature and incidence of accidents and zoonoses to children under sixteen years on farms and in the countryside.

& Part II
A literature review of the nature and incidence of accidents and zoonoses affecting children as farm residents and also users of the countryside.

Prepared by the Institute of Rural Health for the Health and Safety Executive 2003
Farm Child UK

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A literature review of the nature and incidence of accidents and zoonoses affecting children as farm residents and also users of the countryside.

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This research report presents the findings from a quantitative and qualitative study conducted prospectively by collecting data over a sixteen month period through established primary care networks. General practitioners were selected from defined areas of the country in England and Wales to collect data on farm accidents and zoonoses seen in children under the age of sixteen years in primary care. The data was gathered and analysed to identify on the nature and numbers of accidents and illness occurring in children, under sixteen years of age, emanating from the use of the countryside and the agricultural industry. The report presents a typology of high risk situations for childhood accidents and zoonoses connected with the countryside and agriculture seeking to locate the findings within the present body of knowledge by reviewing available literature (separate document).

Discussion of the changing demography in the farming industry and the financial crisis presently affecting farming is pursued as it relates to the collection of data for this project. The belief that increased car ownership and the changes to ‘out of hours services in primary care in recent times is also explored.

Recommendations are formulated for better information, education, suitable childcare, better engineering practices and a review of existing legislation.

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EXECUTIVE SUMMARY

“The farm environment has been argued to pose considerable dangers for children characterised as it is by the presence of physical hazards (machinery, animals), involvement of children in farm activities, little coverage of health and safety legislation and even less enforcement (worksite inspection), and little in the way of formal training.”

(Wolfendon, McKenzie and Sanson Fischer 1992)

The farm environment frequently combines home, worksite, tourism opportunities and leisure facilities making it a unique environment in which to apply health and safety structures.

OVERVIEW

This qualitative research has investigated the nature and the incidence of accidents and zoonoses to children under sixteen years, emanating from the use of the countryside. This may have been as a direct result of living in the countryside, perhaps on a farm, or as a result of visiting the countryside for leisure or education.

Data on fatalities and accidents seen in accident and emergency departments is available but this is believed to reflect a fraction of the events affecting children. Further there is minimal information on zoonoses in children resulting from contact with the farm environment.

The Health and Safety Executive (HSE) utilising the legislation, Reportable Injuries, Deaths and Diseases Occurrences Regulations (RIDDOR), collects information on deaths and serious occurrences which they subsequently investigate. Included in their brief for accidents at work, which need to be investigated, are those requiring in excess of three days away from employment. This is presently the only mechanism for quantifying the size of the problem and it is recognised as unreliable. The reporting of injuries at work is unlikely to apply to those under sixteen years except where in casual employment. As we have not quantified these injuries to children the data informing how and why they occur does not exist making it difficult to design strategies to reduce such occurrences. It remains important to accurately judge the size of the problem as the Government’s overall plan for optimum health for all citizens includes accident reduction.

The report of this research, funded by the Health and Safety Executive (HSE), demonstrates a better understanding of how these events occur and how they may be avoided.

AIMS OF THE PROJECT

- Through the establishment of a primary care network for data collection to quantify the number and nature of accidents and illness affecting children that are attributable to the farm or countryside environment.

- To design, pilot and validate a methodology for collecting the desired data from primary care when the patient is visiting the GP.

- To develop a typology of high risk situations for childhood farm accidents and zoonoses.
To set the study in an international, national and local policy context through a literature review.

To report the findings and make recommendations to HSE.

METHODOLOGY

A project team of experts from various agricultural, health and educational backgrounds was formed to supervise the project. They have met four times during the project to advise on the development of the report. A smaller team consisting of the Chief Executive, a local GP from the Project Advisory Group, the Research Manager and the Researcher have met every two months to manage the project.

The researcher recruited a network of primary care practices across England and Wales in areas chosen to represent farming type. Thirty-six general practices indicated a willingness to take part in the study. Some were single handed, and others large group practices. To ensure that these practices were suitable in terms of rurality and the type of agriculture taking place in their areas a telephone questionnaire was used to make sure they fitted the criteria. In total one hundred and twenty-seven GPs became involved, representing a patient cohort of approximately sixteen thousand patients in total. The practices were situated in Cumbria, North Yorkshire, Norfolk, Lincolnshire, Cambridgeshire, Shropshire, Herefordshire and Dyfed Powys.

Multi centred ethical permission was gained to proceed with the study which was mindful of patient confidentiality. The requirements of the Data Protection Act (1998) were also taken into account.

Prior to the start of the study the Researcher visited each practice and had an opportunity to explain the study to the doctors who were available at that time. If all the practice staff had not been seen by the Researcher it was expected that information would be disseminated internally at practice meetings so that all staff were informed of the study. During this visit the documents designed to collect the data were explained and questionnaire packs were left with the practices. The researcher requested that completed questionnaires should be returned to the study centre for analysis and expenses would be paid to cover the cost of this task.

Prospective data has been collected on accidents and zoonoses affecting children under the age of sixteen years from these primary care practitioners. With the aid of a proforma both quantitative and qualitative data has provided information on the type of incident or disease, the circumstances surrounding it, patient characteristics, the management of the patient and the outcome. This has provided valuable information on the profile of the incidents and assisted in defining high risk situations. It has also directly informed preventative strategy and educational requirements aiming to reduce these non-fatal accidents and exposures to zoonoses.

A database was constructed to assemble the information yielded by the questionnaires ready for the analysis phase.

The ultimate length of the study increased due to the outbreak of Foot and Mouth disease and other factors (outlined below), to twenty-two months of which sixteen months was the active data collection phase.
LITERATURE REVIEW

During the data collection phase of the study a review of the available literature was conducted so that the study findings could be set in the context of that which was already known. It was found that the majority of the literature relevant to this study was to be located in the USA and Canada with further small amounts from Australia, Europe and the UK including Northern Ireland.

Conclusions from the literature suggested the following:

1. The agricultural industry is different from other industries in that it is based within a home environment. Dangerous occurrences involving animals and heavy plant occur where people live and play.

2. Investments in safety measures have not kept pace with those in industry generally.

3. The parents of children are frequently the only workers on the farm or if casual labour is employed there is an expectation to bring children to the worksite. When children are under school age or when schools are closed such as in the evenings, at weekends and during the long holidays childcare is a very important issue.

4. Children view helping on the farm as something they want to be involved with. Parents view encouraging children to help as important for developing a work ethic and an interest in the business. They also believe that by having the children with them they can adequately supervise them particularly in the absence of other options.

5. Farming is viewed by families as a group or family effort.

6. Visiting children do not have any conception of the risks on farms and view animals as friendly and approachable.

7. Farms are not recognised as potentially disease harbouring places and those visiting do not understand the possible risks of serious illness due to zoonotic infection because the child has not acquired the necessary immunity and children do not apply strict hygiene measures particularly before eating any foods.

8. Farming families do not understand child development sufficiently and therefore cannot judge the capability of their children in relation to tasks which either, the child wishes to do or the task which they are asked to do. Nor do they understand how the instructions they issue to their children are received and interpreted by the child.

This can be summarised under four headings.

- Better ways of educating all those involved in agriculture need to be addressed.
- Better childcare, affordable and accessible to farming families needs to be provided.
- Engineering methods to make machinery safer must be employed
- Inspection and punitive processes are important.
CONFOUNDING FACTORS

During the initial phases of this study the countryside was severely affected by Foot and Mouth disease, disrupting all normal activity both in and out of rural areas. The majority of children relevant to this study are those who live on farms. They were very reluctant to leave their farm and therefore to visit their doctor due to the risks of bringing infection back to the farm. Visits did not take place to farms or on farmland and all tourism activity was curtailed. The year could not be considered representative of a normal year for the purposes of data collection. It is for this reason that the data collection period was extended from the originally planned twelve months period.

The volume of expected data to be achieved by this study was based on work done ten years earlier, Evans (1995). Since that time farming has undergone severe economic depression and the numbers of those working in farming have declined. Also young farming families are the group most likely to have left the industry. It appears likely that the number of children living on farms therefore is reduce.

The research was reliant on the GPs to collect the data and there was a lack of control by the research team regarding this important task.

Ethical protocols made it essential that the patient group was informed about who sponsored the study - HSE, and it is known that a small number of potential accident cases were not recorded due to parents declining to give their consent due to fear of recrimination.

The data collection phase of sixteen months was lengthy and the momentum may have been lost over this long period.

Even though the study was focused on primary care providers who were at least twelve miles away from a district general hospital this may not have been sufficiently far away. Today many more people have access to a car and choose to drive to where they believe the service they require is best delivered.

Many on call services in primary care now use remote ‘out of hours’ services able to direct patients to the nearest hospital rather than to the GP.

Hospital accident and emergency departments are not able to collect data retrospectively about accidents or illnesses when the patient was not subject to an admission. Useful data that is available is that collected by the Department of Trade and Industry (DTI) for the Home and Leisure Survey (HASS & LASS).

Due to these factors the researcher is not confident that all possible relevant cases were captured for this study.

ANALYSIS AND RECOMMENDATIONS

The data for the Farm Child UK study only consisted of ten cases, seven accidents and three zoonoses. During the analysis of these ten it was found that situations were demonstrated which bore similarities with those described in the literature reviewed.

- Children under 4 years are a high risk group.
- Falls predominate, frequently they are from a height.
- A high proportion of accidents occur during the spring and summer months.
The majority of parents of the children in the sample analysed accepted that with a greater degree of thought the accidents could have been anticipated and therefore prevented.

The recommendations which emerged as a result of this study are as follows:

- Training, education and information are essential, and delivery should be in a suitable format to be easily understood by those involved. New and innovative approaches advocated in some of the reviewed literature for this study are valuable examples.

- Engineering innovations must be fully exploited by guarding moving parts and effectively preventing the use of the machinery unless adequately guarded. This is especially important after maintenance as getting the machine in use quickly is of paramount importance, meaning that replacing the guard is neglected.

- Barriers to accessing dangerous environments must be introduced and aim at preventing children from reaching places of danger by the use of gates, fences, and locks that are child proof. Alternatively remove the child from the area to a place of safety such as suitable childcare off the farm.

- For childcare to be effectively used it must be affordable and accessible. Major problems arise for the farm parent if they both work during school holidays and at the weekends. In addition, evenings are still busy times on the farm and school finishes well before farm tasks will have been completed.

- The main organisation in the UK for health and safety matters the HSE is not welcomed by farmers, even in an advisory capacity. The HSE have endeavoured to provide very well organised campaigns to encourage safe working practices and greater awareness of the dangers on the farm. The HSE have a mandate to resort to legislation and punitive processes and these have been employed either as a deterrent to perceived dangerous practices or as a punishment for the proven committal of dangerous or illegal practices. Where the law prevents an action policing and punishment are important but should only have to follow on from adequate advice and guidance. Apart from enacting present legislation a review of the existing legislation is believed by the researcher to be essential. One example of the law relating to tractor driving or riding states that at thirteen years this is possible. This legislation dates from 1958 and an examination of the power and capabilities of the modern tractor would suggest this law is no longer suitable for the demands of modern times.

The study concludes with a recommendation that more comprehensive data be collected at the point of treatment, wherever that is, about the nature of the event and the injury or illness incurred. Modern technology has the capabilities to manage and analyse information but it must be collected at the time of the incident. Computer systems must be compatible for the exchange of information. The variables used must be commonly shared amongst different systems, one example to illustrate this is an agreed age of when childhood finishes and adulthood commences.

Farms are areas of high risk and have the potential for accidents or illnesses to persons working, visiting or living on them. However, this should be viewed in perspective with the other areas of risk, living is not without risk. The figures published by the DTI for playground, school, road and home accidents are sadly higher than those for farm accidents affecting children even when the fatalities are considered.
There is no space for complacency in any area generating accidents. The farm is a home, a place of employment and it is a working environment, it is this which makes farming different from other areas of industry and makes agricultural settings vulnerable!
CHAPTER ONE

ACCIDENTS AND ZOONOSES AFFECTING CHILDREN CONNECTED WITH FARMING AND THE COUNTRYSIDE

This chapter provides the rationale for the study.

1.1 BACKGROUND

The Health and Safety Executive (HSE) have a responsibility to promote safe working practices for the employee and to legislate for the provision and usage of the same, as it should be applied to both the employer and the employee. Occupational health strategies outlined in Securing Health Together (2000), emphasise the view of Government that there is a moral, legal and economic reason why agencies must work together (Callaghan 2000), contributing to an innovative programme to make a difference in health terms to the employees. A difference also in economic terms to the employer and the wider economy as accidents are costly, in terms of lost working days. These initiatives have a target date of 2010. The HSE has a role in occupational health and safety, investigating omissions and to prosecute where necessary but more importantly to educate and to foster a cultural change in behaviour. Safe working practices are a heavy burden of responsibility for the employer who not only has to provide a safe environment but also has to make sure that the employee does not circumvent the initiatives made for their safety and welfare. Health and Safety considerations are expensive, small organisations and lone workers find the investment beyond their means on occasions. The employee can find adhering to safety arrangements makes working slower, and irksome.

It is important that working within the framework of Securing Health Together the HSE is viewed as an adviser contributing towards revitalising health and safety strategies by -

- compliance
- continuous improvement
- knowledge
- skills
- support mechanisms

The Reportable Injury, Disease or Dangerous Occurrence Regulations (RIDDOR) seeks to ensure the reporting of serious accidents and it is the legislation used by HSE when investigating a serious occurrence or accident. Again this is viewed as threatening by those employers and employees who come into contact with it.

The HSE is working innovatively to make certain that strategies are developed to ensure the promotion of better working environments and protection from harm. To contribute effectively there is a need for improved data on agriculture incidents of high risk, farming has been identified as a priority industry (Williams 2002).

One such area for data collection is on accidents at work and although there are criteria for reporting accidents to the HSE implementing the legislation offered by RIDDOR this does not happen sufficiently. The Government routine labour force survey for 1990 (HSE 1999-2000) noted that they believed generally only one fifth of the non-fatal accidents occurring were reported to them. Accident books should be completed for an accident at work. An investigation should examine details, gain understanding of the aetiology of the event (Strueland et al 1996) so that lessons can be learned, the correct facts recalled when needed which is often some time away from the event.
The traditional farming industry, part of the agricultural sector, is experiencing change but remains unique as an industry located in combination as a workplace and a home. The garden may well be the farmyard where work activity takes place involving machinery and animals. The buildings, storage areas and the content of such areas may be hazardous to the environment, to workers and particularly to children to whom it is also home and playground.

Children cannot conceptualise risk as they have largely no fear (Davis et al 1988). Although physically they change and grow stronger, mental and emotional development is harder to conceptualise (Shutske 1999). The farm is not the place for them to be unsupervised and yet the HSE know they are there, that they are involved in accidents. Sadly there are also fatalities; eight in 1996/7 and four in the latest figures for 1999/00.

“Children aged five to nine years often have difficulty following rules and signs on streets; differentiating right from left; localising the source of sound, perceiving movement in their periphery; processing data in a timely fashion”

(Shutske 1999)

It is also recognised that serious illnesses can be contracted from the surroundings that are less than hygienic and that children, due to immature immune systems, may be more at risk of serious consequences than adults. Although frequently it is the visitor to the farm rather than the farm dweller so affected.

“It’s children on farms - may be at risk but they recover from most things and their general health is better than that of most urban population e.g. they have less asthma”.

(Morgan 2002)

The dangers attached to the farming industry need to be understood by all who use the countryside for leisure, work or education. These areas have all the facets of an industrial zone yet are regarded as areas for recreation, frequently beautiful, peaceful and isolated.

Farms are frequently some distance from emergency amenities something which can alter an accident into a fatality when time and skill are of the essence. The isolated locations of such accidents suggest the need for special transport arrangements for casualties which can offer treatment and stability at the scene.

“Immediate mortality and delayed morbidity (severe sequela) may be reduced”.

(Vanneuville et al 1992)

To endeavour to be more effective at protecting this vulnerable group the HSE needs to quantify the problem. There is recognition by the HSE of large-scale under-reporting, frequently attached to the element of fear of prosecution. The possibility of gaining information on such unreported incidents from accident and emergency departments is shown to be unreliable, as frequently the nature of the accident is not explored (Grant 2002); it is just an injury receiving appropriate treatment. Many individuals, including children, may be treated at home or by their general practitioner (GP), a profession that does not normally collect statistics to indicate how frequently such cases are seen.

Occupational health, working in partnership with public health, as individuals and organisations will be aware of preventative approaches that are advocated and the benefits for both the individual and the economy which can accrue. A major dimension therefore will be the identification of strategies to educate, to change behaviour, to engineer where possible and to legislate to make life at work and leisure safer.
It is to constantly improving safety in the workplace that research is applied allowing a better understanding of the size, nature and circumstance of the problem and what is likely to ameliorate the situation.

1.2 AIMS

This research aimed to offer a better understanding of the aspects of accidents and zoonoses as they affect those under sixteen years of age in the countryside. The focus was on non-fatal accidents. Fatal accidents are reliably investigated under RIDDOR legislation. To endeavour to capture the numbers of accidents and illnesses presently unrecorded this study has been designed to work with primary care providers (GPs) to gauge how many such cases they have seen over a defined period.

It was agreed as important to study areas of the countryside which are representative of the farming activities carried out in England and Wales. Further the research looked at rural areas which are sufficiently remote from urban centres where hospital services are more readily available. The circumstances of the incident have been explored to better understand what might have made a difference. From the study, new approaches must emerge which will make knowledge more accessible to those who need it; farmers, the workers, family and the children all groups which are vulnerable, needlessly harmed or lost on occasions.

To support the study design and to facilitate the learning opportunities offered by the research a review of the literature, local, national and international was conducted and preceded the reporting of the final results.

This report documents the research findings and aims to identify strategies to further the endeavours aimed at protecting people, especially children, from accidents and zoonoses connected with the countryside, as outlined in the document Securing Health Together and targeted for demonstrable change by 2010.

1.3 LITERATURE SUMMARY

An extensive review of the available literature from international sources has been considered for this research study. The document is available separately and the following is a summary.

It is questionable whether the hazards to which people are exposed are understood by those responsible for opening the countryside to visitors, those working in the countryside or those visiting it.

1.3.1 Accidents

Life on a working farm is not complete pastoral serenity. Fatigue, time pressures and malfunctioning equipment combine with frequent inclement weather and dark nights to make farming a most dangerous occupation (Sterner 1991).

The agricultural sector in the USA averages one fatal injury to a worker every week from a work force of approximately 3.1million, and one to a member of the public every month (May 1990). Those farms employing less than eleven workers remain outside the jurisdiction of legislation in the USA; the Occupational Safety and Health Administration (OSHA) do not have jurisdiction in these small family enterprises (Aherin, et al 1990 cited by Schhma et al 1997). The author goes on to say that fewer than 4-10% of farms, at the time the paper was written, fell into this category. As a consequence, children working on farms are subject to few regulatory protections. Strueland and Lee et al (1996) found that one third of agriculturally related accidents to children occur when they are
merely observers. When child accident deaths are compared by cause farm related incidents are ranked third after road accidents and fires. (Gaffney and Darragh 1993). Many authors identified in the literature reviewed for this study have noted that mortality is a major concern in rural accidents. Studies in Australia have highlighted this noting that death from injury is greater in number in rural areas than urban areas. Gaffney and Darragh (1993) noted that in Ireland death occurred at the site of the accident in all but two of the seventeen cases they examined that involved children. They believed that this reinforced the serious nature of such accidents and the importance of expert care at the scene. In South Australia between the years 1988 to 1992, 82% of 201 hospitalised childhood injuries resulting from workplace environments were from agriculture and 73% of 37 children admitted with machinery related injury had sustained the accident on the farm. In the United Kingdom, during the last decade, fifty-six children have died as a result of farm accidents, hundreds more have received injuries, many of which are never quantified, a factor highlighted by Baxter (1992).

Falls cause approximately fifty percent of injuries to members of the public connected to agriculture according to data (HSE 1999-2000) and children are included in this group. This has been followed in the order of slips and trips, injured by animals and being struck by flying objects. Suffocation in grain bins and silos (Sterner 1991), plus drowning by inadvertently falling into water troughs and butts, has been acknowledged as a serious risk to children who once in the situation cannot extricate themselves. Children have a natural curiosity and in particular are inclined towards machinery. Doyle and Controy (1989, cited by Mercer) found a distinct relationship between accidents and unguarded machinery, water and slurry. Caststles (1998) reported on a large number of occurrences concerned with electrical injuries and shock, also the outbreak of fire as a major hazard.

Information appears to suggest that in general industry accident prevention is working whereas in farming industries it is not. It can be derived from this comment that insufficient consideration has been given to researching the causative factors for farm injury compared with that given to industrial workplace injuries in general. Another related factor is the remote nature of some farming accidents and the difficulties in injured persons being reached and effectively treated by the emergency services. Many studies have suggested that over the post-war years injuries have increased and deaths have decreased. A reason put forward for this altered pattern is that treatment options have greatly improved during these years. Vanneauville and Corger (1992) believed the medically assisted transport unit (SAMU Unit) used to provide intensive management in the cases they examined saved lives and reduced severe sequelae. Lives have been saved and Mercer (1998) makes this point as one of the important strategies for the welfare of children on farms. Kemp and Dennis (2001) stated that accidents in general are two - three times higher among disadvantaged groups and that in Wales 30% of children live in poverty. The nature of modern farming is creating considerable financial duress and poverty should be considered as one of the contributing issues.

Reed and Claunch (2000) attempted a systematic review of non-fatal injury incidence in the USA, affecting children, and were thwarted by the lack of valid and consistent denominators which impeded the obtaining and comparing of incident information. They urged strongly the need to standardise the measurements taken in research, particularly the short-term and long-term consequences of events. Wolfendon and Lower et al (1992) in Australia noted that understanding the specific features and patterns of rural injury and the differences from urban counterparts is a prerequisite to preventive action in rural areas.

Shutske (1994) argued that to protect children from their own arrogance it is important to direct education into preventing children performing tasks rather than into attempting to teach them a safe way of performing the task. Further as children continually break rules as part of the barrier breakdown in growing up they should be encouraged to make their own rules to regulate their own behaviour. The comprehensive study by Mercer (1998) reached very similar conclusions regarding
recommendations. In particular she noted the lack of knowledge, amongst parents, regarding the developmental stages reached by children. Reflection on the work of Piaget (1929 cited by Tassoni et al 1999) and other child development theorists so that an appreciation of the actual capabilities of the child may be fully understood is advocated.

American, French and UK based studies advocated adequate, affordable and acceptable childcare for working farmers and their families, especially in school holidays and after school hours, something that would greatly assist parents and keep the child away from the hazards.

A primary emphasis on education and behavioural change was essential but the studies reviewed did not disregard a review of legislation both punitive and preventative. Schools are an excellent educational forum for the acquisition of social knowledge and skills and every effort should be made to work with a captive audience both rural and urban. Legislation where it is employed must be effective and enforced but it should not be regarded as the most effective method of producing changes in behaviours.

Engineering and modern technology must be employed to make as safe as possible the working environment.

1.3.2 Zoonoses

As a population we are encouraged to access the countryside for leisure purposes. Therefore the risks of exposure to untoward events are not just to those working and living on farms but also to the wider population. This group does not have the agricultural background and the benefit of knowledge gained within familiar structures to facilitate safe behaviours in the countryside.

There has been considerable interest in many countries in zoonotic illnesses and the effect it may have on human health. Many agencies in the United Kingdom including the Public Health Laboratory Services (PHLS) and Food Standards Agency (FSA), the Health and Safety Executive (HSE) and the Centre for Communicable Disease Surveillance (CDSC part of PHLS), have a continuing important interest in the epidemiological understanding of these disease processes, especially where there is a risk to human health.

The increased interest in epidemiology and disease surveillance applied to zoonoses (those diseases passed form vertebrate animal to humans), has drawn attention to fresh ailments and to what appears to be an increased incidence. This increase may reflect higher levels of attention given by primary care as there is now a reported general tendency for patients to present with symptoms earlier at the GP, rather than self-treating ailments.

A report compiled by the Microbiological Safety of Food Funders Group, (MSFFG) using a range of research by public funded organisations over a period from 1990 to June 1999 aimed to identify the transmission routes and noted food borne transmission, person to person spread, and environmental spread as the main groups but suggested that the relative magnitude of the three pathways in importance is not yet fully understood. Smith and Palmer (1996) noted that reporting is voluntary and that laboratory proof of a zoonotic connection only represents a fraction of the actual cases occurring in the community.

The human body is designed to have internal protection from assault by disease. It is only when the outer covering cannot resist, is damaged, or the internal environment is altered by treatments for other conditions, changed acid balance or impaired immune function that undesirable organisms enter and achieve pathological status. While many of the zoonotic illnesses that have been described in this study are troublesome via the ingestion of pathogenic organisms other possible outbreaks of
disease are described in papers reviewed for this study, as caused by the inhalation of pathogens. Absorption through the skin which is undamaged, an open wound, bite or via the conjunctive in the eye are other vulnerable areas where zoonotic disease can enter the human body.

The majority of the recommendations require that the behaviour of persons change and that knowledge is disseminated to the widest population to encourage understanding of the causes and the effects of undesirable behaviours or environments. Prevention is simple if only people achieved a level of awareness at national, regional and local level regarding zoonoses and in particular the main sources of gastro intestinal infection, affecting children especially those who visit farms or handle animals. Gastro intestinal infection occurrences can be reduced and in many cases prevented by effective personal hygiene.

The separate document containing the full literature review is available, please see Jones (2002)
CHAPTER TWO

OVERVIEW

This prospective research study concerned with incidents affecting children, has aimed to determine the incidence and risk factors from the countryside and farm associated accidents and zoonoses that would be seen in primary care settings in England and Wales. The research activity has been designed to meet the ethical requirements associated with issues of confidentiality. The aim has been to identify ways to benefit from the countryside and to identify possible situations where harm can result from visits to the countryside or living and working there. The report concludes with recommendations to safeguard children in the countryside. A multi-disciplinary steering group consisting of the Health and Safety Executive (HSE) together with a range of academic and rural health professionals have met at least four times during the research phase to support the research project. (for the group membership see the appendix). Their participation has been required at all stages of the project to offer expert advice and supervision as the project progressed. International and national literature from academic papers and policy documents have been reviewed. Local initiatives in each of the study areas have been investigated. The information yielded is available as a distinct section of the final report. The management of the project has involved the supervision of the researcher by a manager within the Institute of Rural Health (IRH). A Project Team consisting of the Researcher, the Research Manager and the Chief Executive of the IRH plus a local GP acting as Clinical Director for the project has met every two months to facilitate the project.

In addition opportunities to attend conferences and seminars to present the findings of the research have been taken, dissemination of the findings has been via two reports published by HSE.

2.1 METHODOLOGY

2.1.1 The Research Objectives

- To establish a primary care network for data collection on farm accidents and zoonoses in the UK.
- To pilot and validate a methodology for collecting comparative data on farm accidents and zoonoses in primary care.
- To determine the incidence and nature of childhood farm accidents and zoonoses that are seen by primary care professionals either on the farm or in the health care centre.
- To develop a typology of high risk situations for childhood farm accidents and zoonoses.
- To set the study results in a national and local policy context through a literature review and desk research.
- To identify the training implications for primary care professionals dealing with farm related childhood accidents and zoonoses.
- To identify any areas for further research.
Using the objectives the following research question emerged

- In how many cases seen in primary care in the under sixteen year age group can the symptoms be attributed to a countryside occurrence?

2.1.2 Previous Research

Evans (1999) published evidence of findings from research he conducted earlier into farm accidents, as a primary care provider for a rural population. He thought it would be valuable to see how many and what type of accidents his practice and also another close by became involved with. The research, combined two practices creating a patient group of 11,000 that yielded 112 accidents. The age of the patients were between 2 and 73 years. A number of the patients were under sixteen years and males were found to be more at risk than females. The data collected indicated that 75% of the accidents that occurred had been fully managed within the primary care setting.

The literature reviewed for the study FARM CHILD UK has not identified any other studies that focused on primary care providers. In America in particular there has been considerable interest in understanding the factors associated with injury to children in agriculture and the development of methods of prevention. This has been a continued theme in other literature found for the study from many other countries.

2.1.3 Study Design

Having considered both the reported findings of Evans (1995 and 1999) and the findings revealed in the literature explored to support the study, it was decided to ask general practitioners to work with the researchers to try and identify the nature and size of the problem. Data relating to the characteristics of the patient and the circumstances prevailing at the time of the accident have helped in understanding the factors involved. Data collected and the usage of the same will be under the guidance of the multi skilled advisory committee. Policy makers will benefit in four ways:

- Evidence has been provided on the extent of the problem and includes information presently unavailable from current reporting methods.
- The level of under-reporting has become more visible.
- The study has been able to inform on the high-risk situation allowing for the development of preventative strategies.
- Identification of training and educational needs has been possible.

In association with a multidisciplinary advisory committee the areas of the country to be researched were chosen following discussions held at the first advisory group meeting, at the outset of this project. The criteria for the selection was:

- The rural nature of the area.
- The distance from the nearest accident and emergency department, (distance in excess of twelve miles).
- The type of farming enterprise common to the area.
Primary care providers fitting this criteria have been selected. There was an aim for a balance of both large multi partnered practices and smaller, even single-handed practices.

The geography of England and Wales has been considered and the type of farming activity noted. Farming activities that were identified were arable, sheep and beef, dairy, pigs, poultry and horticulture. The geographical areas eventually chosen were Cumbria, North Yorkshire, Lincolnshire, Norfolk, Cambridgeshire, Shropshire, Hereford, Powys and Dyfed. Information was obtained on the primary care practices within these areas of the country and individual practices were contacted about the study. The primary care practices selected to participate were contacted by the researcher to establish their degree of interest in the study and willingness to work with the project. The main contact was with the lead GP, however in many cases there are several doctors working in partnership or training in primary care practices. The researcher visited those practices expressing a willing to take part in the study to provide information and a resource pack for use during the study.

2.1.4 Research Cohort

A study conducted in mid Wales Evans (1999) found that in twelve months seven non-fatal farm accidents occurred in the under sixteen age group from a practice list size of eleven thousand, thus suggesting an incidence of 63.7 per 100,000 population.

The majority of patients in the first instance have been believed to visit their own doctor in the primary care setting. For this research project it was calculated that to obtain 100 cases of farm accidents occurring in children under sixteen years a sample population of 157,233 would be required. The average list size of general practices in rural areas are around 5,500 therefore a minimum of 29 practices would be required for this study. To allow for a margin of error, thirty six practices have been recruited. For this study the smallest list size was 1200 and the greatest 9000, an average list size of 4929 patients was encountered. This was believed to be sufficient for a worthwhile number of cases to be presented to the study. The manner of selection and invitation to the identified practices taking parting this study have been explained in subsequent sections but generally the aim was to encompass all types of farming activity and also the range of topography applying to farm land in England and Wales.

In addition to accidents, zoonoses pose further dangers for populations. Children in particular may be at an increased risk due to poor and immature immune systems. The majority of patients would present primarily at the GP surgery for assistance. The problem of zoonoses has gained notoriety due to several high profile serious and at times fatal cases of mainly e coli 0157. Children have been encouraged to utilise the countryside for education, leisure and fitness, this apart from those children who live in the countryside, in many cases on farms. There has been little information available on the vulnerability of this group to associated illnesses.

Policy makers desired more exact knowledge of the size of these problems as they affect children in particular. Consequently this study has collected data on farm accidents and zoonoses in this vulnerable group.

2.1.5 The Areas and the Practices

A proforma designed for use as a telephone survey by the researcher was used to confirm the suitability of the practice for this study. It asked about the locality, the nature of farming in the area, the type of agricultural and the numbers of children who might be expected according to the list size and the number of partners in the practice.

The researcher worked in the study areas listed above and visited each of the thirty-six practices that
had indicated a willingness to work with the project. In some cases the researcher was able to present the project to all of the partners and in other cases only one representative doctor was able to give an appointment to the researcher. In this case the doctor interviewed had agreed to disseminate the information to the whole practice at a subsequent practice meeting.

2.1.6 Data Collection Tools

The research has been quantitative by nature and the questionnaire must be efficient in collecting the facts about the patient and the injury, including how it has been caused and treated. Confidentiality has been respected for all parties concerned, therefore an ethical approach to the design has been vital. Navigating the forms for speed and efficiency for all concerned means this has require careful consideration.

The questionnaire, administered by the general practitioner at the time of the consultation with the injured or ill patient gathered pertinent data. A further short questionnaire was also handed to the patient for them to take away and complete when they felt sufficiently recovered so that a degree of follow up of the patient has been possible. Once completed, the questionnaire has been returned to the researcher for analysis. No identity of the patient by the researcher has been possible and the normal codes of practice prevailing between the GP and the patient have not been breached during this research study.

Qualitative data, always useful to support quantitative methods has been very desirable. Suggestions put forward by the research team in the proposal for this study indicated how this might be achieved and have received scrutiny by those funding the project.

Owing to pressures placed on the farming industry, especially following the outbreak of Foot and Mouth disease it has been decided by the sponsors for this study not to make any further incursions into farming family lives by asking questions directly with faming families. Therefore the study did not avail itself of this opportunity.

Copies of the study tools are available in the appendix.

2.1.7 Ethical Considerations

The study respondents are all under the age of sixteen years and therefore important aspects of parental consent, or consent under the Gillick criteria, needed to be embraced before this study could begin.

The design of this study, using eight different areas of the country, permitted an application to the Multi-Centre Research Ethics Committee for permission to proceed with the research, and if granted, would obviate the need to apply to each individual local ethics committee, thus saving considerably on time.

Documents to be used by the patient in Wales were required to be available in the Welsh language.

All the documentation and the storage of the same met the requirements of the Data Protection Act (1998).

Confidentiality has been maintained and no reference has breached this either for the patient or the practice involved in assembling the data.
2.1.8 Pilot and Practice

The proposed time scale did not allow for a formal pilot to be carried out however the advice of the expert Advisory Group for this project was used in the methodological design.

2.1.9 Analysis

The data gathered during the study has been entered into a database to allow analysis to describe the nature and incidence of occurrences. A written report has been submitted to the advisory group for discussion prior to the submission of the findings to the HSE.

2.1.10 Timescale

The project had initially attracted funding for eighteen months of which twelve months was to be the active data collection time. During this period a comprehensive review of the available literature has been conducted to support the findings of the study. However important changes were made to the timescale for this study due to the outbreak of Foot and Mouth disease which struck the United Kingdom just as the data collection phase started. Owing to movement restrictions affecting people and animals, the activity in the countryside could not be considered representative of normal times. This was bound to affect the number of cases recorded by the study. Also this change occurred just as farmers and potential tourists were eagerly anticipating Spring and Summer, a time when incidents in the countryside connected with accidents and zoonoses might have been expected to increase due to more visits and activity generally.

Following consultation with the Health and Safety Executive it was decided to expand the data collection phase by four months thus making a sixteen month data collection phase endeavouring to capture part the period of the year missed early in the study when the disruption was at the highest. The study lasted a total of twenty-two months following this revision of timescale.

2.1.11 Maintaining Awareness

For a study of this duration momentum has been encouraged by regular contact with the researcher using a variety of contact methods. These have varied from telephone interviews conducted by the research co-ordinator to written reminders about the aims of the study which have included posters indicating the dangers for children relating to the countryside, (examples are included in the appendix).

Quality control during the study offered an opportunity to question professionals that are working on this project about the methodology used in the design and maintenance of the data collection tools. This has provided an opportunity to gauge an opinion about the degree of satisfaction or otherwise the professionals working on the project have felt toward the researcher and the team that have been charged with the task of collecting and analysing the data.
CHAPTER THREE

3.0 EVALUATING THE DATA

The research methodology placed considerable reliance on the primary care sector for the collection of the data for subsequent analysis. The actual data achieved numbered only ten cases rather than the expected one hundred. The possible reasons for this reduced amount of information will be discussed more fully in the next chapter.

The data collected for the research study by general practitioners in primary care is examined on a case study basis as follows.

3.1 CASE STUDIES

Closer scrutiny of the data received for this study shows-

Case Study A

A male child aged four years and nine months attended the doctor as a temporary resident. He was not resident on the farm where the accident occurred, but a visitor and friend of the farm child. The farm in question was both a family home and a business for the breeding of poultry and horses.

The accident occurred in the autumn and the conditions on the day were described as clear, calm and sunny. Although daylight the time of the incident was 16.45 and the occurrence took place in an outbuilding or barn where the child was playing.

The detail of the accident indicates that the child had access to a bottle of sulphuric acid which was dropped by the child. It smashed and acid splashed onto the child’s face and legs.

Since the accident the parent has acknowledged that the child was playing in an inappropriate place. It is accepted by those in the care of the child that the accident could have been anticipated, was preventable and the action which has now been taken should have been taken earlier.

It seems that in this case buildings had been acquired for use and not properly explored for their contents or secured against entry.

The child was treated at the scene by a doctor who was immediately available to offer first aid which in the event was all that was needed. However if the acid had remained in contact with the skin or splashed in the eyes the injury could have been severe with lasting consequences.

No further treatment was required and the child made a full recovery.

Case Study B

A farmer’s own daughter aged eight years and four months attended her own doctor after an incident on a farm where she lived. The farm, a sheep unit was identified as the source of the problem which occurred in April, a time associated with lambing and close contact with sheep and their off-spring.

The child presented at the doctors with inflammation and soreness affecting her hands. The
diagnosis was orf although this was clinically based and not laboratory proven. Treatment followed and a full recovery was made. The child did not have time away from school. Although not indicated in the response from the doctor or the patient it could have been argued that this was a condition that could have been anticipated. The farmer would have been aware that handling sheep and newborn lambs presented a risk. Contracting orf as a result is moderately common among workers with sheep. In this case the possibility that feeding lambs may have resulted in the condition in the child was a detectable hazard. Children on farms commonly have a pet lamb if it is orphaned and it is a very appealing time of year to be with the animals. It may have been decided that the advantages of sharing in activity at such a positive time of year outweighed the risks.

Case Study C

This incident affected a daughter aged eleven years and eleven months. The family were not farmers but horse owners. The accident happened in the autumn at 14.00 on a dry day with good visibility. The young girl was with the horse and foal, on a grass field, feeding grass by hand to the foal when her fingers were bitten by the horse. The hand involved was the preferred hand. Penetrating puncture wounds to the fingers resulted. The wounds were treated by the nurse and a full recovery followed. One day away from school ensued. The circumstances surrounding this incident were that the activity was regarded as play or helping with work.

In this case there are issues regarding the safety of a child in a field with a horse and foal. In the act of offering feed to a horse or foal by hand one is placing ones self at risk and knowledge is needed to even attempt to do this safely. Children would not know unless taught and even with teaching the child needs to be confident. Although many children feed horses there are definite risks to be identified. This activity was hazardous.

Case Study D

A mixed stock and arable farm was the site of this incident. The farmer's son aged thirteen years and four months attended his own GP at the local hospital outpatients department.

The injury was an amputation to part of thumb on the preferred hand. This resulted from building a Go Kart and the string associated with the motor mechanism wrapping around the thumb.

The victim was playing although on a farm at the time. It is not believed the incident could have been anticipated or that the individual was in an inappropriate place for their age and the activity. The equipment being used was not modified and no other persons were involved.

The patient was treated at a district general hospital where a minor operation would have tidied the wound. Time away from school followed the incident. The patient will always be without the full use of a thumb. In hand injury severity scores the thumb rates high on the list as most co-ordinated dexterity requires a pincer movement of thumb and index finger.

Arguably this was an accident that did not result from inappropriate behaviour but possibly a hazard analysis could have altered the way things were done. It seems from the information at our disposal that the activity was appropriate for the age of this child but perhaps supervision was needed.

Case Study E

This male child aged one year and ten months was with grandparents at the time of the incident. However it is believed that he was a farm child. The parents / grandparents farmed beef and sheep. It was in the spring at 13.30 on a clear and dry day. The accident involved a stock trailer but it is not
clear where the child was in relation to the trailer; “moving by trailer” is the information available. The injury sustained consisted of lacerations to face and neck. The patient was seen by the doctor and treated by the nurse at the practice.

The information supplied shows that the child was playing at the time and that in the view of those concerned the circumstances causing the accident were not preventable, could not have been anticipated and the child was not thought to be in an inappropriate place at the time.

This child was not quite two years old and arguably the farmyard is not an appropriate place for a child to be playing. The detail is scarce but it appears that the stock trailer was either being moved or loaded or that the individual concerned might have been inside it.

It is believed that a hazard assessment of this type of environment would have found the place unsuitable for such a young child.

The patient made a full and uneventful recovery.

**Case Study F**

The son of a mixed beef and sheep farmer, aged two years two months had an accident on the farm where he lived. It was summer time at 18.20 on a dry clear day.

The child wanted to sit in the tractor cab. At the time it was stationary, on the farmyard and the door was open.

The child fell out head first and sustained injury to the head and arm. The right wrist was sprained in the attempt made by the child to break his fall, bruises and abrasions occurred on the forehead and mandible.

The carer of the child admits that the child was in an inappropriate area and that such an accident should have been anticipated in such a young child. The child was treated at the GP surgery and made a full recovery.

**Case Study G**

The daughter of a dairy, mixed stock and arable farmer aged three years and eleven months had an accident on the farm where she lived and was treated by her own doctor. It was spring time and the conditions at 11.30 were wet on the day of the accident.

The child was a passenger on a moving quad bike in the field and the terrain was described as muddy.

The child was projected forward and consequently when she fell off she was run over by the bike. No detail is given of the injuries but the patient was seen by her own doctor and discharge as needing no further treatment so it must be assumed she was fortunate and made a full recovery.

The carer did not feel that the child was playing or working so there is an unproven possibility which may be deduced that this was a supervision or a childcare issue. It was not thought that the accident was preventable or could have been anticipated by the carer. Based on the evidence regarding the circumstances this latter point could be questioned.
Case Study H
This twelve year old boy who lives on farm land was believed to have ringworm. Scrapings were sent to the laboratory but in the event did not grow anything specific. The lesions were seen by the GP and treated by the nurse, at the surgery. Care continued at the time of the report.

Case Study I
This accident occurred in a livery business run by the parents. The daughter aged fourteen years and three months suffered a serious injury and was seen initially in the casualty department and transferred to a regional unit for further treatment and care.

The accident happened at 9.0 am on a dry autumn morning on grassland. And involved a gelding but no further description is supplied.

The injuries were described as cuts, grazes and a depressed fracture of the skull resulting in loss of consciousness. It was suggested, by the patient or carer, that the accident took place while working. It could have been anticipated that the task or activity at the time was not considered inappropriate for the individual.

This was a serious event resulting in neuro surgical care in a major hospital and follow up afterwards in the outpatient department. The patient had three weeks away from school and even then was only able to attend halftime for a while. She cannot ride again for a further six months. Fortunately she seems to have made a complete recovery.

Case Study J
This is a case of suspected cryptosporidiosis in a female child, aged two years three months. The patient, not a farm resident was visiting her grandparents who live on a dairy unit. The child was noted to have developed a diarrhoeal illness in association with feeding calves that also had the scours. Specimens where taken and the child was admitted to the local DGH as the problem had not resolved at home after one week. The child was later discharged and made a successful recovery. This study is unable to confirm the exact nature of the diagnosis as the laboratory information has not been disclosed. The researcher believes that this incident could have been prevented as the area containing sick livestock is unsuitable for small children with no ability to acquire the necessary immunity. Further, feeding calves no matter how appealing is not without risk.

KEY POINTS FROM THE ANALYSIS (column 5  * A= Accident, Z= Zoonosos)

<table>
<thead>
<tr>
<th>CASE</th>
<th>HOME</th>
<th>VISITOR</th>
<th>MOR</th>
<th>OR</th>
<th>A OR</th>
<th>Z*</th>
<th>SEASON</th>
<th>TIME</th>
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<td>Z</td>
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<td></td>
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<td>✓</td>
<td>M</td>
<td>A</td>
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<td>M</td>
<td>A</td>
<td></td>
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<td>Clear</td>
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<td></td>
</tr>
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</table>
### 3.1.12 Refused Consent

Three accidents are known to the study where consent to contribute was refused. Two were from the same family and the other was a fifteen year old female. All three were farming families. Unfortunately there is no more information available.

### 3.2 CONCLUSIONS FROM THE ANALYSIS

The data collected for this study was only concerned with the non-fatal occurrence. Sadly the study has been made aware of two child fatalities in the study area occurring during the study period. One aged fourteen and the other aged two both were males either on a farm or on farmland. This data is not directly relevant to the study but it does reinforce the point that although this study did not attract much data the problem is still there. When accidents occur they tend to be of a serious nature with serious consequences.

The amount of data available for this analysis has been small and the reasons why this is believed to be the case are discussed at some length in the following chapter.

Even with this small amount of information some conclusions have been drawn which correlate with the literature reviewed for the study.

Six of the ten cases are under the age of thirteen years. Three of these were zoonoses. Thirteen years is the age selected because it was first identified and used in 1958 when the first regulations called ‘Avoidance of Accidents to Children’ were put in place by Government to safeguard children. These rules were reviewed in 1998 under the heading ‘Prevention of Accidents to Children in Agriculture’ (PACAR), but the age was allowed to remained the same and primarily concerns driving tractors on farmland.

The literature reviewed and the HASS and LASS data from the Department of Trade and Industry notes that the age range 0-4 yrs is the most vulnerable. This sample had four such cases in the ten and they were all accidents. If the zoonoses cases, of which there were three, are discounted it leaves seven accidents and four of these were in the under four year age group. This means that slightly over half the accident cases were in this young group and this finding correlates with the findings in the literature review claiming this young group is the most vulnerable. In this group three were male children and one a female and again correlations can be made with the literature reviewed.

<table>
<thead>
<tr>
<th>CASE</th>
<th>AGE</th>
<th>COULD HAVE BEEN ANTICIPATED</th>
<th>COULD HAVE BEEN PREVENTED</th>
<th>UNSUITABLE AREA</th>
</tr>
</thead>
<tbody>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
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<td>8yrs 4 mths.</td>
<td>Yes</td>
<td>Yes</td>
<td>Not really</td>
</tr>
<tr>
<td>C</td>
<td>11yrs 11 mths.</td>
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<td>Yes</td>
<td>Possibly</td>
</tr>
<tr>
<td>D</td>
<td>13yrs 4 mths.</td>
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<td>No</td>
<td>No</td>
</tr>
<tr>
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<td>1yrs 10 mths.</td>
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<td>Yes</td>
</tr>
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<td>Yes</td>
<td>Yes</td>
</tr>
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<td>3yrs 11 mths.</td>
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<td>Yes</td>
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<tr>
<td>H</td>
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<td>Yes</td>
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<td>No</td>
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<tr>
<td>I</td>
<td>15 yrs.</td>
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<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>J</td>
<td>2yrs 3 mths.</td>
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</table>
When patients or their families reviewed the circumstances of the accident a high percentage noted that the event could have been anticipated and was probably preventable if a hazard analysis had been correctly carried out, many realised the place of the activity was not appropriate to the age of the victim.

The view by a parent that placing a child on the front of a quad bike (even after an accident) was not seen as inappropriate is alarming. It was fortunate that this child was not killed or severely injured. The outcome might have been very different if the child’s head had struck a boulder or other hard surface. The part of the body run over might make the difference between life and death. This lack of a true and accurate appreciation of how events might unfold is mentioned in the literature and particularly relevant to the understanding of child development and capability highlighted by the Marshfield projects in the USA (www.marshfieldclinic.org and Shutske 1994)

Research conducted for Morecambe Bay Health Promotion in the UK by Exeter University (2000) found considerable ambivalence to riding on machinery, both parental and child views do not seem to indicate any appreciation of the dangers.

All of the accidents reported to the research study occurred in daylight and all but one occurred in dry clear conditions. They were spread between autumn, spring and summer and two of the accidents occurred on a Saturday, both of these involved horses and affected females.

Wolfendon and Lower et al (1992) found that the afternoon and weekends were particularly relevant times for accidents. Stallones and Gunderson 1994 and Purschwitz 1990 concur with Wolfendon stating, the child under five is at the greatest risk, especially if male. Falls are reported by these authors to be the commonest cause of accidents and this study received reports of four fall associated incidents out of the seven accidents reported. Ball (2002) made the following point about falls affecting children in playgrounds and arguably this is what farms become. Again it is the development of the child physically which may have an effect on the type of injury sustained.

“Also apparent for the elderly was a reduced tendency for the use of a hand or arm to break the fall and because of declining strength with age such attempts might anyway be less effective. This raises the possibility of a similar effect with young children in playgrounds, whose speed of reaction, arm strength, and body mass distribution vary significantly with age during early years.”

3.2.1 ZOONOSES

Buchan (1995 and 1996 also Paiba and Thomas et al 1999) identified the risks of orf to farming personnel and noted how significant it can be at lambing time when children delight in feeding lambs by bottle and generally helping where possible. Mainly the condition is self-limiting and healing occurs without scarring. In some case complications have occur due to secondary infection and in these cases antibiotic therapy may be required. Buchan believed that only a quarter of those affected sought the assistance of their GP.

One case of ringworm was reported to the study although not clinically confirmed. Maslen (2000) noted the prevalence of this fungal infection in cattle and the readiness with which it can be transmitted to those who work with these animals and importantly in their environment. It is possible to become infected by handling the gate for example, where the animal has rubbed against it. All family members are at risk of these skin lesions. Domestic animals are also able to transmit this infection to humans. Housing animals indoors increases the risks and due to the climate in the UK winter housing of animals is usual. Effective hygiene measures are the only protection apart from wearing gloves when handling infected animals, materials or fixtures and these are not very practical. Further, all parts of the body are at risk usually resulting from touching for example the
face with an infected hand. Gloved hands can transmit just as readily as those ungloved. Treatment with anti fungal cream is usually effective in resolving the problem.

These two cited zoonoses are not severe in their consequence and it would seem that the benefits of the freedom to be in the environment and also to care for young or pet stock outweigh the risks in these two cases.

In the third zoonoses case, one of possible Cryptosporidiosis there is a suggestion that adults are not sufficiently aware of the risks posed by animal faeces in the spread of disease to humans, especially children. This could have been contact with e. coli 0157 and the results may not have been so happy. Young children should not be in contaminated surroundings. Usually cryptosporidiosis presents as a diarrhoeal illness and the suggestion is that about one quarter of incidences are associated with farms and occur in young children. Other sources of infection are water and person to person contact. This particular presentation does not allow for differential diagnosis without laboratory examination as there are other diseases presenting in the same way.
CHAPTER FOUR

DISCUSSION

The following paragraphs have examined some of the identified confounding factors which applied to this research study.

4.1 Under Reporting

The Health and Safety Executive (HSE) are aware that accidents and illnesses are not accurately reported or quantified and this is particularly the case in the farming and agricultural sector. Boyle (cited by Haycock 2002) quotes from a statistical survey, carried out by the University of Wales College of Medicine, Cardiff, of agricultural injuries treated at hospital that suggests only 3% of minor injuries and 17% of major accidents were reported to HSE. Boyle is involved with a ten year study at Ceredigion and Mid Wales NHS Trust and he reports that during the first five years sixty-two children under sixteen years, from the agricultural sector, were treated for accidents in Bronglais General Hospital and six community hospitals where the data is being collected for this area.

It is believed that this has reflected only a very small percentage of the actual unreported incidents and it is suspected that 75% of accidents on farms are managed in the primary care setting (Evans 1995). His study hoped to clarify this suspicion by collecting data from primary care for accidents and illnesses affecting children which related to the agricultural / countryside setting.

The expectations held by this study for data volume regarding accidents and illnesses affecting those under sixteen years had been based on previous studies. In particular Evans (1995) had demonstrated interest by quantifying such occurrences seen in primary care, and therefore likely to be unrecorded elsewhere. This recognised lack of quantification resulting from under reporting and attending for care at a variety of settings continues to stimulate debate about the size of the problem.

One study (Evans 1995) conducted in primary care, collected data for one year about non-fatal farm accidents in all age categories. The data found one hundred and twelve accidents and 75% of these were fully managed in the primary care setting.

The GP Morbidity Database in Wales was explored to see if any trends on accidents were evident. Unfortunately this tool does not have accidents or zoonoses listed as an area of exploration.

During 2001 Foot and Mouth disease affected the countryside making a huge difference to the way it was used and accessed. Further, in the last ten years and since the work of Evans (1995), it is possible that changes have been taking place meaning that the picture presented on accidents to children is different from that reflected in the study of Evans. The considerable difference in the data collected for this study compared with that of Evans and also that indicated by the international literature reviewed for this study suggests a changing picture. The following discussion aimed to reveal what some of these differences may be.

4.2 Countryside Accidents

The Department of Trade and Industry (DTI) have two databases on which useful and relevant data applicable to this study might be recorded. They are called the Home and Accident Surveillance System (HASS) and Leisure and Accident Surveillance System (LASS). There are two useful categories listed, one called Farm/yard/barn, cultivated field/ and the other uncultivated field/country/wood/forest. These seemed relevant categories for this study and the query raised as a
consequence yielded the material in the table below. The figures gathered reflected the national situation based on samples from eighteen hospitals designated for collecting the required data. These eighteen hospitals remain fairly static over time, except when the individual hospital asks to be withdrawn and a replacement is then found. In these hospitals clerks interview patients presenting with an accident, to try to gain more detail about the nature and circumstance surrounding it. The present figures are available up to 1999 from the mid 1980’s although in the earlier periods the classifications are so different that comparisons are unreliable.

The focus for this data is on the UK position overall, so the DTI convert the figures from the eighteen hospitals which are only indicative of a trend to reflect the situation nationally by multiplying these numbers by a national multiplier, thereby achieving a national estimate. The National multiplier varies from year to year (depending on what proportion of UK A&E new attendances are accounted for by the HASS/LASS hospitals).

It is possible to see what multiplier has been used by dividing the national estimate by the figure shown in the total line in the graph. Between 1993 and 1999 the variation in multiplier is between 49.7 to 18.29, as demonstrated below (Raine 2002).

Leisure Accidents at 'farmyard/barn/cultivated field/land' or 'uncultivated land' involving 0-16 year olds, 1993-1999

<table>
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<tr>
<th></th>
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<tr>
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<td></td>
<td>713</td>
<td>723</td>
<td>824</td>
<td>1518</td>
<td>1313</td>
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<td>29455</td>
<td>30125</td>
<td>29161</td>
<td>25879</td>
<td>25682</td>
<td>25204</td>
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</tr>
</tbody>
</table>

Department of Trade and Industry: Consumer Research (Hass & Lass)

An examination of the 1999 data indicates the accidents are resulting in minor injury and from the selection viewed only one admission to hospital occurred. There were eighty-six occurrences and the split between males and females was 53/33. Information extrapolated from this data shows that the highest risk in age terms is 9yrs, 12yrs and 13yrs. Boys have three times as many incidents in this age spectrum with ratio of 22/8. In the female group between 9 yrs and 13 yrs four slipped in mud or on long grass, one jumped off bales, two were horse related and one was quad bike related. Only two were in the 9 yrs group the remaining six incidents were to 12 and 13yrs females.
An examination of the sample of eighty-six incidents supplied by the Department of Trade and Industry showed that seventy-six accidents could have occurred on any grassland, playground or common land. Horse related accidents accounted for three cases, field sports occurred in one case and one further case involved water. The remaining five cases are the only ones whose description could in the loosest sense be attributable to an actual farm location.

Figures supplied by the Ceredigion Agricultural Injury Group - Farm Accident Statistics, for the under sixteen years age group, are shown below. There does appear to be a downward trend indicated in this data.

**Farm Accident Statistics (Ceredigion)**

<table>
<thead>
<tr>
<th>Year</th>
<th>93/94</th>
<th>94/95</th>
<th>95/96</th>
<th>96/97</th>
<th>97/98</th>
<th>98/99</th>
<th>99/00</th>
<th>00/01</th>
<th>01/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>17</td>
<td>18</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Ceredigion Agricultural Injury Group

4.3 The Fear of Authority

The studies by Evans (1995 & 1999) used as a basis for the methodology for this current research, were conducted by an interested general practitioner working within his own practice. There was a level of personal interest in making sure cases were not missed. Also there was no suggestion of outside interest from a Government body. This and the fear of interference from HSE, who are viewed as a legislative and punitive organisation, in the business and personal life of a patient and their family has in at least three cases known to the study resulted in a refusal to consent to participate. Evans would not have encountered this effect.

4.4 Participant Consent

In instances, where parents or guardians have refused consent to take part in this study, even though the strongest reassurances have been given, fear still remains about the investigation of the causes and results of accidents. Anecdotal evidence from a general practice involved in the data collection, that has been in receipt of a refusal from a parent to contribute to the study is available. In this case there were two children in the family who had suffered a farm related accident. At first it was considered that the shock of the whole event caused the blanket refusal. At a later date further attempts were made by practice staff to encourage cooperation but the position remained unchanged. The mother suggested her reasons stemmed from fear of reprisal. This lack of co-operation restricts the knowledge available to researchers and is stifling the development of fresh initiatives for prevention. Evans (1995) had local Health Authority approval for the study but did not have to ask for consent from the legal guardians of those under age for consent as he was privileged to receive the information as the patient's doctor and only he was using it. The consent factor makes the data collection more complex in the preamble to asking the questions and the formality can be off putting to the potential participant.

4.5 Foot and Mouth Disease (FMD)

The Countryside Agency 2001 noted the following comment

"the very fabric of rural life had changed"

Cameron (2001).

The Agency perceived the areas hardest hit to be Cumbria, Devon, Herefordshire, North Yorkshire
and the North East of the country. Also affected severely were Powys and some parts of Shropshire. These included all our study areas. Pembrokeshire another of the study areas was notable for not having any cases; here the City Farm in that area was closed for the entire year. The report from the Countryside Agency highlights the impact of the disease on revenue from tourism. Within this it is clearly stated that the whole of rural Britain closed down and as a consequence visitor numbers dramatically fell with a corresponding increase in the use of out of town shopping malls and city centre tourist attractions.

The Countryside Agency report addresses the nature and type of countryside pursuits affected by this disease outbreak, either because of actual restrictions, or due to public perception of what those restrictions might be. The activities listed include riding, walking, climbing, shooting, angling, leisure boating, agricultural show attendance, smaller community-based activities, events cancelled and sporting fixtures postponed or cancelled. The Countryside Agency (2001) believed it notable that at least 1000 attractions for tourists would normally be expected to be open in April, these were all closed. The reports paint a very clear picture in economic terms of a countryside starved of people visiting and this can be translated into altered use for the purposes of this study in farm accidents and illnesses. One conclusion that has been drawn is that if people do not visit or play in the countryside accidents and illnesses will be markedly reduced.

The Institute of Rural Studies examined the results of a survey of tourism businesses in rural Wales conducted in March 2001 and found a 75% loss of business in Welsh tourist enterprises at that time (Christie and Youell et al 2001). The picture of loss persisted and affected future bookings particularly in inland rural areas.

Other comments contained in a report (Deaville et al 2002) aiming to understand the health impact of this disease outbreak on farmers and service industries in affected areas noted that bed and breakfast had to stop completely. One area was closed completely and this included footpaths, a bird sanctuary and local climbing areas. Other comments stated “we did not hire out a single bike until August”, “people were reluctant to venture out” and camping and caravanning stopped completely in rural areas specially where sited on farm land.

Public Health Laboratory Services have noted that the incidence for human Cryptosporidium in England and Wales, coincident with the foot and mouth (FMD) outbreak, have substantially reduced. Spring and autumn peaks are characteristic for incidence of human Cryptosporidium and are associated with water run off from farms and also the use of animal slurry. There has been a suggestion that the FMD controls reduced the risk of cryptosporidiosis in man through diminished population exposure to livestock and the rural environment. (CDC Weekly).

4.6 Decline in Farming

Figures released from the Department of the Environment, Food and Rural Affairs (DEFRA) in 2001 suggest that nearly 60,000 jobs have gone in the farming industry over the last three years. This is made up of farmers actually leaving the industry (18,000 in the year 2000, compared with 30,000 the two previous years) or going part-time and the loss of farm employee jobs, thus being a cumulative loss. In fact the figures provided show a downward trend in all categories examined, except part-time working which shows a small increase amongst farmers, owners, spouses and directors. The sectors including part-time workers, seasonal and casual or gang labour also show continued decline over years 1996 -2001. Part of the scale of change can be attributed to Foot and Mouth, economic withdrawal from the farming industry accounts for some of the reduced personnel contained in these figures and the figures only represent those known for the June Census as reported to date. Accuracy may be questionable; if an individual has left farming they may not actually be identified within the census collected information. This view is supported by Christie et al
(2001), where it was shown that during the Foot and Mouth crisis 4% of farmers were considering leaving the industry and 2% were planning to retire earlier than had previously been expected. Furthermore 5% of farmers continue to actively reducing the paid labour used on their farms. It is expected that this disease episode will increase the exodus from farming and associated service industries and be shown in subsequent census reports. Government statistics available for the last five years endorse the position on a downward trend in farm employment and farm ownership and can be fully explored via the Office of National Statistics at [www.statsbase.gov.uk](http://www.statsbase.gov.uk). Figures based on the June Census return must be viewed with caution as they are based on individual holdings and do not allow for the fact that some holdings may have increased in size due to amalgamations. However there is a reflection of the personnel in that one farmer, in the case of amalgamation, may be doing work that had been previously done by a number of individuals prior to that amalgamation. The existing trend of farm amalgamations forming larger and more intensive units is likely to continue. Evidence appears to indicate that the poor profitability of farming has resulted in fewer young farmers being attracted into the industry. This is likely to change patterns of succession and even lead to farm abandonment and re-wilding of the countryside as advocated by some conservationists (Christie et al 2002).

The June Census information was also used to gain an impression of the age groups remaining in farming with a particular focus on the holding run by possibly reproductive aged parents grouped as the under 39yrs group. The following data shows clearly the marked reduction of holdings in this group, contrasting sharply with the figures for age groupings by holdings in the remaining two tables. It is believed this information is significant and indicates that there may indeed be a reduction in young children on farms now, compared with previous years.

<table>
<thead>
<tr>
<th>Study Areas</th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>2000</th>
</tr>
</thead>
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<td>145</td>
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<td>599</td>
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<td>Lincolnshire</td>
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<td>291</td>
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<tr>
<td>Norfolk</td>
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<td>560</td>
<td>231</td>
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<tr>
<td>Shropshire</td>
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<td>525</td>
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<td>Nrth Yorkshire, Nrth Allerton</td>
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<td>357</td>
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<td>Nrth Yorkshire, Beverley</td>
<td>181</td>
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<td>42</td>
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<tr>
<td>Powys</td>
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<td>845</td>
<td>246</td>
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<tr>
<td>Dyfed</td>
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</table>

Percentage of farmers in age groups 25-29yrs

|                  | 13.48% | 10.75% | 13.71% |

<table>
<thead>
<tr>
<th>Total Holdings by County</th>
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<tr>
<td>Reproductive aged group</td>
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<td>Age Groupings &lt;25-39 yrs</td>
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<tr>
<td>Years</td>
</tr>
<tr>
<td>1993</td>
</tr>
<tr>
<td>1995</td>
</tr>
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<td>1997</td>
</tr>
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<td>Shropshire</td>
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<tr>
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<td>Powys</td>
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<tr>
<td>Dyfed</td>
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<td>Totals</td>
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Percentage of farmers in age groups 25-29yrs
## Middle aged group

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<td>Dfyed</td>
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<td>20019</td>
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</table>

### Percentage of farmers in middle age groups

- 1993: 36.80%
- 1995: 36.53%
- 1997: 39.92%

## Pre retirement to retiring group

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<td>Nrth Yorkshire, Beverley</td>
<td>386</td>
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<td>138</td>
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<tr>
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<td>2839</td>
<td>702</td>
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<td>Dfyed</td>
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</tr>
</tbody>
</table>

### Percentage of farmers in age 55-65yr age groups

- 1993: 49.72%
- 1995: 52.70%
- 1997: 46.36%

[www.statistics.gov.uk](http://www.statistics.gov.uk)
The following graph indicates the trend in Northern Ireland and the position in the UK is similar

4.7 NHS Direct and Out of Hours Services

During 2000 NHS Direct became available as a service offering telephone advice to patients and also directed the patient in some cases, to attend the local accident and emergency department for treatment. In a similar way, out of hours services have changed from local doctor co-operatives to NHS Direct 'out of hours' cover or triaging services. In this case rather than call a doctor out to attend a patient or as in the past to attend a small community hospital casualty department, patients are being directed to larger District General Hospitals, staffed 24 hours per day.

Accident and Emergency departments usage as evidenced by figures provided by the Assembly for Wales where the start of NHS Direct as a service is recorded as 13 June 2001 are interesting. The following figures taken from the Assembly information suggests that there may be a trend for increased usage of Accident and Emergency department since NHS Direct began in Wales. Here between the years 1999 to 2000 an increase of 0.154% (n1,325) is indicated in the figures. The period 2000 to 2001 when compared show an increase of 1.548% (n13,306). This large increase in the number of patients of all ages and conditions presenting at A&E covers one and three quarter years of NHS Direct in Wales, and is suggestive of a change in patient behaviour when choosing a health care provider, especially for a perceived emergency.

A pilot study being conducted in Shropshire, one of the study areas for the Farm Child UK project, continues to examining the effectiveness of a nurse led triage system. Here, calls previously dealt with by 'out of hours' services, called co-operatives, in this case ShropDoc, are now being dealt with by NHS Direct. The A&E Consultant for the District General Hospital has agreed to be quoted as detecting "a noticeable increase in attendance at his department", however as the arrangements for the amalgamation of services settled this did fall back towards previously recorded figures. The following point was made

"suggested figures for increased patient attendance of 2% per annum. Patients are demanding more immediate services and the appointment system for primary care does not have the capacity to offer this immediacy, the patients presents at A&E inappropriately demanding immediate attention and that this demand is outstripping the service capacity".

(Prescott 2002)
The ambulance service continues to receive referrals from NHS Direct and is similarly very busy with a suggested five-fold increase in demand for patients to be taken to the A&E department in this hospital, this is in addition to the normal emergency calls which are received. Prospective patients are also gaining an impression of this type of service and taking themselves in the first instance to accident departments.

Further, a GP has informed us that if after a telephone conversation with a prospective patient it is clear that hospital attendance may be required, for example for a radiological examination, the patient would be asked to go to hospital rather than first attend the doctor’s surgery. This doctor suggests that a cultural change is taking place. Patients, rather than request GP care or even a home visit will make the decision to go straight to hospital services.

The South West NHS Trust also commented (Grant 2002) that seeking retrospective information about A&E attendance was very difficult and costly and ascertaining where the accident happened may not be possible, as the data may not be recorded for that information. Therefore if the reason for the attendance was due to a farm accident this may not be identified unless the appropriate questions were asked at the time the patient gave their details. This is another reason for the lack of quantifiable data.

Dr Reading a paediatrician from Norfolk and Norwich NHS Trust agreed that NHS Direct was being used, effectively it was felt, in this area and in addition there were ‘walk in centres’ where patients could be seen without appointments. This is taking some work away from GPs. It is possible that this links with car ownership (see below) and the greater independence people have achieved. Such changes will impact on patient attendance in the primary care sector.

A Rural Services Report (2000) indicated that 91% of the population live within 7.5 miles of a hospital, including community hospitals which are staffed by general practitioners. Such hospitals frequently offer convalescent, geriatric services, day clinics and a GP serviced accident and emergency department. This links with the ability of people to access these services as described below.

4.8 Car Ownership

The Department of Transport and motoring organisations support the suggestion that car ownership has continued to increase over the years. It follows that many families have more than one vehicle at their disposal and that many more adults can drive. The assumption might be made, that greater mobility has made it easier for rural and remote dwellers to access main stream services such as those provided by a District General Hospital, accident department. National statistics are quoted as saying

"people who live in rural or small urban areas are more likely to own a car as they have poorer public transport services to assist them in reaching shops, doctors surgeries and hospital services. Here the car is a necessity rather than a reflection of income."

(Statsbase 2002)

Car ownership statistics indicate that a 5% increase in car ownership has occurred between the years 1991-2000. There has also been a 5% increase in the ownership of two cars per family in this time frame especially in high income groups such as professional, employer and managerial groups.
4.9 Zoonoses

Dr Liam Donaldson quoted Polak (2002), in a speech for the Public Health Strategy launch stating

"there is considerable under reporting from GPs into the present disease surveillance system".

Highlighted was the present Public Health Control of Disease Act 1984 listing 31 infectious diseases that need to be reported to Public Health Departments by GPs. Dr Donaldson (2002) noted that current reporting level is only 40% of what might be expected. A Surrey GP is quoted as stating that

"if treatable, and not regarded as a public health hazard by the GP, it will not be formally reported".

To support the argument that this would only require more expenses in laboratory testing to confirm that which would respond to treatment anyway. In connection with this Dr Nigel Higson (cited by Polak 2002) in the capacity of Chairman of the Primary Care Virology Group requested

"simpler quicker tests and computer systems facilitating ease of reporting".

There is debate about the public self-reporting but GPs do not have confidence with this suggestion.

A number of the zoonoses included in the questionnaire for Farm Child are reportable but also not serologically proven incidents. Further there are difficulties, without expensive investigation, of identifying the causative factors, allowing reliable separation for some illnesses into zoonoses or food borne infections.

Investigation of cause and effect does not take place unless there has been more than one incident in an area deemed sufficient to constitute an outbreak. It is only then that samples would be taken from the environment such as a farm to form the proven association with cause and effect.

The statistics, collected and published by the Public Health Laboratory Services, also fail to make the distinction in gastric type illness between the food borne and the truly zoonotic.

4.10 Accident Prevention Initiatives

In the study areas, which have aimed to be representative of the whole country, various initiatives have been taking place for some periods of time looking at children and their safety. One is Powys Farm Accident Reduction Project, which started in 1996 after the work of Evans who published in 1995 and 1999. The only analysis of this project was done after 1993 and 1999, comparing the figures from Evans in the first instance and their own data in the second instance. The figures showed an approximate 20% reduction in accidents but they concerned all age groups. The efforts of this group have continued with action in the schools particularly in Child Safety Week and National Science Week where they have found the material they offer is acceptable and helpful to support the National Curriculum.

A Safety Initiative called Crucial Crew is aimed at children aged 10-11 years and covers law and order, substance misuse, road safety, first aid, cardio/pulmonary resuscitation, drowning and farm safety. This is well received by schools sending children to designated centres for this training. Sufficient funding is a major problem and limits the scope of this type of project. One area, Shrewsbury and Oswestry combined offer two weeks for these activities per year and attract 1,500 children. The courses, replicated in Telford and other parts of Shropshire, are always oversubscribed. Unfortunately there is no data available to indicate the success or failure of this venture although the evaluations from participants and their schools would appear to indicate that they are regarded very
positively. A private training company is also involved in producing worksheets for children to complete, with the help of their teachers, when they have not been able to participate in Crucial Crew due to a shortage of places. Those working with the project have mentioned that the use of virtual materials for training appears to be very attractive and when tried absorbed and interested the children.

North Yorkshire Education Department produces materials to advise about farm safety, especially when on a visit to a farm with the school. This is handled by the Science Advisory Team and would therefore be applicable to the National Curriculum. In addition they distribute information obtained by Royal Society for the Prevention of Accident (RoSPA) on dangerous plants and fungi.

Child Safe Wales part of the All Wales Injury Surveillance System, Collaboration for Accident Prevention and Injury Control (CAPIC) is very active in offering education on a range of child safety issues. The countryside and farm accidents being just one.

4.11 Play Activity

The advent of television fifty years ago meant that entertainment came to the people rather than them having to go out to seek it. Green and Bigum (cited by Furlong et al 2000 / 2001) argue that traditional youth culture has been supplanted by 'techno-popular culture', and it is now the natural environment of the young. When looking at computer usage in the family, case study investigation identified use as moderate to high with 70% of the children within the cohort studied reporting ownership of a computer in the home. In many families, games software had the longest history with children taking part in purchasing decisions. Analysis suggests 40% of boys are playing games every day and expressing an interest in the technology itself as opposed to only 6% of girls who are happy to use whatever is available. Further the ownership of a games console was high and particularly noteworthy across all economic groups with 83% of low income families owning such a facility. The electronic age has changed the way children pass their time by bring an interactive capacity to entertainment.

"the prevalent picture of child computer use was one of games player".

Furlong et al (2000 2001)

This means that children can obtain their thrills and spills virtually and do not need to go outside to have adventures. Children indicate that computers are a popular alternative to other activities such as sport and other outdoor activities. The huge amount of computer software available to entertain children can answer the question regarding the success of these products.

Conclusions from the report by Furlong et al (2002/2001) suggested that although there has been a massive culture change in child computer usage the author would not yet categorise it as evidence of a generation of 'cyber kids'. However it must be considered as part of the armoury for educational tools and possibly related to less out-door accidents.

Health professionals concerned about child fitness and weight have supported the notion that they are sitting passively with these electronic games rather pursuing a physically active role in adventure play.

Anecdotally there may be reasons to suppose accidents to children generally and especially those attached to farming activity may be reduced due this type of behavioural change.
4.12 Participant Perceptions. Confounding Factors

The above issues must be part of the picture explaining the vastly reduced data yielded by this study. To further the reasons for lack of data a quality assessment was made to review the perception of the study and its reception by the primary care practices that had agreed to work with the researchers on this important issue.

4.12.1 Quality Assessments

Temptation existed to explain the lack of data using the arguments posed above. However to avoid the assumption that these were the only forces affecting the data, a survey was conducted asking the two fundamental groups in the primary care sector for their views on the manner in which the study was carried out, and the methodology for the study. The two groups were the Lead GPs and the Practice Managers from each of the practices involved with data collection.

The survey, solely using the arguments presented above asked the same ten questions of both groups. The GPs received their survey questionnaire in the post, with a stamped addressed envelop, for return of the document. The Practice Managers were asked to complete their proforma over the telephone with the researcher. The different direction for the delivery of these questionnaires was chosen because of the recognised difficulties in asking general practitioners to come to the telephone when the majority of their day is spent in consultation with patients. Practice Managers are office based and usually able to deal with telephone queries spontaneously.

Practice Managers returned twenty-nine, six practices did not have a manager and could not be included making thirty-five returns.

Not all the GPs in every practice were asked to respond. For this work each practice was approached and the Lead GP selected to respond to the questionnaire. Out of a possible total of thirty-six only fourteen returns were realised however this is not uncommon in a postal survey of GPs.

4.12.2 Survey Report from the Practice Managers

Questions directed at the contact with the researcher and the quality of the information attracted high scores in excess of 72% positive response. The arrangements made by the researcher to maintain contact with the practice during the study was also warmly received with half of the group recording 89.65% positive feelings.

When asked about the frequency of mention the study received at practice meetings only 20.68% said regularly, 37.93% thought occasionally, 24.13% said when it started, 10.34% acknowledged never, responses for frequently and not known recorded 3.44%.

The reminder posters were viewed positively by 82.75%, with 6.89% feeling they were less than useful and 10.34% saying they couldn’t say. One verbal response was that insufficient wall space was available and many other issues demanded display space.

The majority of Practice Managers felt that farm ownership, plus tenant managed farms indicated a trend suggesting a decline in their practice patient group. Slightly in excess of half the cohort at 55.17% felt the farming group in their patient cohort would be aged fifty years plus and probably not have any descendants taking over the business, suggesting a reduction in children in the farming cohort.
Almost half (48.27%) of the Practice Managers felt the numbers of accidents treated in the practice in the under sixteen age group were very similar to comparable numbers ten years previously. However they indicated the sources for these accidents were mainly school buildings and playgrounds (48.27%) with the remainder of responses being very similarly divided between the home and a feeling that comment could not be made, numbers being 24.13% and 20.68% respectively.

All of the Practice Managers interviewed said they had not seen any farming accident and felt that Foot and Mouth was responsible. Further anecdotal comments were as follows:-

- The practice is rather dysfunctional.
- Doctors not well motivated for this type of thing.
- Computers not yet able to respond to queries about cases.
- Posters are crucial.
- We liked the screen saver best of all.
- The coming of milk quotas reduced the numbers in farming.
- Mechanisation has made a difference to child involvement in farming compared with activity I remember thirty years ago.
- Rurality in our area is being lost to commuter belt territory.
- GPs are not interested in this type of project.
- It has gone on too long to maintain the interest.
- This is a good issue to highlight.
- Only one of our three doctors was interested.
- We may have missed cases.
- The City Farm in our area has been closed all year.
- You give good clear instructions when you contact us.
- No phone hassle is good.
- These studies conflict with other demands on time.

4.12.3 Survey Report from the Lead GPs

Only approximately one third of the doctors asked to respond did so. From this group comments supplied to support their responses ranged from the following:-

- Noticeably no accidents to report to this study, this has not always been the case as we have had horrendous ones in previous years.
- The study needs to go on longer.
- Patients and parents are reluctant to give their consent.
- The questions (in the GP survey questionnaire) are too subjective and any comment I make will be meaningless.

There was an element of personal opinion in the answers given but the aim was to gain an appreciation of changes to patient groups and their profile as seen by those working with them. Statistical evidence is available to show that large numbers of farmers are leaving the industry. It is also recognised that people are migrating from the city environment on retirement to retire in rural locations. These people will not have young children and also may not use the countryside in the same way as those working in it.
It was deemed important to gain an impression from the doctors regarding their opinion about the research methodology and the contact they had with the researcher about issues of quality. Their responses have been grouped together and suggest that 76.9% appreciated the contact with the researcher and were positive regarding the quality of the information received. One doctor commented that they hadn’t met the researcher and therefore could make no comment. This was the case for a number of doctors as they were unable or unwilling to give the researcher an appointment. In these cases it was hoped that the practice manager could be relied upon to relay the information on behalf of the researcher. The remainder (15.38%) of the doctors all raised a score on the medium to positive side of the quality assessment. Sufficient explanation of the documents was claimed by 92.30% of the responding doctors and 76.92% felt the study would contribute to knowledge about this subject. All of the responses about the maintenance of contact by the researcher during the year were positive, with 76.9% being very positive.

Only 15.38% mentioned the study regularly at practice meetings, 53% said that the study was mentioned occasionally during practice meetings and 30.76% acknowledged that it was only mentioned at the start of the study.

Posters have been used along with letters of encouragement and phone calls to keep the study profile high and 76.90% felt this was “helpful”, 46.14% of these rated it “most helpful”. On the less positive side 23.07% felt they had been of “little benefit”.

The questions became more anecdotal in style when asking about trends and 46.15% of doctors felt the farming group as part of their practice cohort was slightly less than ten years ago. Those feeling it relatively unchanged were 30.76%. Again 38.46% of the doctors felt that there remained a good balance in the farming community in their area, of young people and families. However 30.76% of the doctors responding felt the farming community was shrinking to the fifty plus year group whose children were probably not continuing in farming. Of those commenting 23.07 % believed that mature farmers had children continuing in the business.

When asked about the numbers of accidents to those under sixteen years treated in the practice 38.46% of doctors believed there had been little change over the years. Those believing there to be slightly less approximated to 30.76%.

It appears, from the responses by GPs, to the question about the locations where accidents occur that little enquiry is made and that the significance of this information is not understood as (30.77%) of doctors indicated they “didn’t know”. Of those that responded to this question the playground accounted for 38.46%, school buildings 7.69% and the home 23.07% of the location of accidents according to the opinion of the doctors.

This lack of knowledge about the location of an accident suggests that cases relevant to this study may have been missed. It seems little enquiry is made into the background surrounding an accident, or even an illness, by the doctor in the consulting situation.
4.12.4 Comparing the Two Groups

The following numerically represented information gives an at a glance idea of how the two groups felt about the study. It must be remembered that thirty practice managers responded compared to fourteen GPs.

<table>
<thead>
<tr>
<th>Point Enquired Into</th>
<th>Satisfied</th>
<th>Mostly Satisfied</th>
<th>Not Satisfied</th>
<th>Satisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>76.9% (n10)</td>
<td>72% (n21)</td>
<td>15.38% (n2)</td>
<td>7.69% (n1)</td>
</tr>
<tr>
<td>Managers</td>
<td>72% (n21)</td>
<td>72.4% (n21)</td>
<td>79.31% (n24)</td>
<td>10.34% (n3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Useful</th>
<th>Mediocre</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>15.38% (n2)</td>
<td>53.84% (n7)</td>
<td>30.76% (n4)</td>
</tr>
<tr>
<td>Managers</td>
<td>24.12% (n7)</td>
<td>62.10% (n19)</td>
<td>13.78% (n4)</td>
</tr>
<tr>
<td>Regular mention at practice meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact and reminder posters</td>
<td>19.14% (n6)</td>
<td>37.93% (n11)</td>
<td>23.07% (n3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farming families as part of patient cohort</th>
<th>Unchanged</th>
<th>Balanced</th>
<th>Shrinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>30.76% (n4)</td>
<td>44.81% (n14)</td>
<td>53.84% (n7)</td>
</tr>
<tr>
<td>Managers</td>
<td>44.81% (n14)</td>
<td>55.17% (n16)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accidents to the &lt;16yr group</th>
<th>Unchanged</th>
<th>Slightly Less</th>
<th>Do Not Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>46.15% (n5)</td>
<td>46.14% (n7)</td>
<td>15.38% (n2)</td>
</tr>
<tr>
<td>Managers</td>
<td>51.71% (n15)</td>
<td>20.68% (n6)</td>
<td>27.58% (n9)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accident location</th>
<th>Playground/school</th>
<th>Home</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>46.15% (n6)</td>
<td>23.07% (n3)</td>
<td>30.77% (n4)</td>
</tr>
<tr>
<td>Managers</td>
<td>48.27% (n14)</td>
<td>24.13% (n7)</td>
<td>27.56% (n9)</td>
</tr>
</tbody>
</table>
4.13 Conclusions reached from surveys

Conclusions can be drawn as a result of the questions asked in this survey even though they hinge heavily on the opinion of individuals.

- The methodology was acceptable to those asked to help with the data collection.
- The materials designed to collect the data were well received, thought to be sufficiently clear and easy to use.
- The approaches made by the researcher to meet with and explain the project to the professionals had been well received and valued.
- The reminders had been useful in the majority of practices but in some there was insufficient space to display them. Some confusion about who they were for in terms of the patient area or the doctor area emerged. Also so much information is received by practices there is a conflict when prioritising order of importance.
- Overall opinion seems adamant that less accidents, especially those emanating from farms or countryside, are presenting to primary care providers. It is not known if they are going to hospital environments.
- Opinion seems in line with statistical trends suggesting that the farming population is less and many of those remaining do not still have young families. Further the mature children they have are not continuing in the business in many cases.
- The accidents and illnesses treated in primary care are not explored for source sufficiently and missed cases are very probable.
- Primary care is very overburdened with work and doctors find it especially difficult to work with research programmes. They find they get too many such requests and there is insufficient time in their working day to deal with all the issues, they have to prioritise.
- The use of the countryside changed dramatically during post February 2001 due to Foot and Mouth disease and this must have contributed to the lack of data achieved for this study. Confounding affects are also a reduced and aging farming population. The primary care system is over burdened and finds it difficult to adequately analyse and document certain aspects of the work which does not immediately affect patient care. The populations may find it easier to take their requirements for care straight to the accident and emergency department, even though they are some distance away. Distance related to this study was expressed as in excess of twelve miles. This may be a result of more car ownership and more of the population (husbands, wives and partners) being able to drive.
- The issue of fear remains about investigations by the Health and Safety Executive and for this reason consent was refused in some cases. The researcher is aware of three definite cases in this category.
- Also of importance but not resulting from the questionnaire is the introduction of NHS Direct and the new arrangements for out of hours care as offered by primary care. These agencies will frequently advise a patient to attend the local accident and emergency service. Follow-up information from such departments back to the patient’s GP about the nature and treatment of an incident should be provided. It was hoped the study would access this retrospectively so as not to miss relevant cases. However this is clearly unreliable and an altered situation when compared to the work of Evans (1995)
4.14 Summary

The above discussion has suggested some of the confounding factors affecting the amount of data available to this study for analysis. Clearly in the ensuing years since the work of Evans (1995) the changes to the farming industry may have made a huge difference to the risks children are exposed to. The numbers of children on farms may have declined. The more sophisticated nature of child play may mean that rough and tumble in the farmyard is less likely. Instead children are more occupied within the house, playing electronic games. Imaginative play may have been superseded by the virtual world. Increased independence in mobility due to car ownership may mean treatment takes place outside primary care. Excluding the general public from the countryside definitely has a major impact on the number of incidents affecting them, both accidents and disease.

The involvement of primary care providers as agencies for the main source of data collection remains a valid choice even though it places increased demand on already overstretched services. Consideration must be given to minimising the difficulties posed by this type of extra work. In prioritise their work collecting data for other agencies clearly falls below patient care needs. This is one of the difficulties noted by the Public Health Laboratory Services (PHLS) in the collection of incidence of reportable diseases as discussed above. However PHLS do congratulate GPs in many aspects of information provision and gathering, data is collected usefully by electronic means from primary care on a regular basis.

Lack of direct control in data collection is a hazard likely to affect the volume and quality of the data. This study asked others at some distance from the research base to be responsible for collecting data, a major component of the research. Efforts were made each month to stimulate contact with those collecting the data however it was not possible to supervise this activity. Some of the participating doctors were asked about the possibility of missed data. Anecdotally they felt able to assure the researcher that the numbers of accidents seen in the year March 2001 to February 2002 were far less than the previous years figures indicate. They felt sure they had not missed cases and also commented that the largest group of accidents to children resulted from playground and school settings. The figures quoted, when the doctors were asked, ranged from sixteen accidents in this age group at one practice to seventy-eight accidents at another, constituting guide figures for accidents cared for in primary care settings within the prescribed age group for this study.

Asking for consent formalised the seeking of information required by a formidable legislative and punitive Government body. This frightened some prospective interviewees and they felt unable to comply with the study.

The research with the primary care providers however concluded that the presentation of the study was received very positively and the aims were laudable. The primary care teams have seen in the past the consequences of farm accidents and zoonoses with their dreadful results and they are keen to welcome initiatives aimed at reducing these events.
CHAPTER FIVE

The review of the data collected for this study allowed the formation of the following conclusions.

5.1 CONCLUSIONS

A review of the data collected for this study, together with the material from the literature reviewed, indicates that accidents and zoonoses will happen in association with risk taking behaviours to any individual, however they can be minimised by attention to hazard analysis in every type of employment.

We know accidents happen to mainly

- Males
- Aged 0-4 year (greatest number)
- Ages up to nineteen years (significant)

Most accidents are connected with falls either from a height or resulting from trips and slips. The data explored in this study had a number of such examples.

The situation of the farm business in the home environs is a very important factor in the risk taking behaviours of children. The commitment made by individuals to running their business in economic adversity with limited employed help, and therefore using all the other resources at the farmers disposal, can only aggravate issues surrounding the supervision of children.

The literature has recognised the need for adequate, affordable and accessible childcare provision. This can be difficult as farming is a twenty-four hour, seven days a week occupation often governed by the weather. The law makes certain provisions about the availability of childcare referring to nurseries and childminders which may affect when it is available.

There have been a number of child fatalities involving the very young child where the child has accompanied a parent into the work area and therefore been supervised, but in the event some distraction has caused separation and then dreadful consequences. Arguably the young child should not go out of the house and garden unless properly restrained. Young children would not normally be able to wander on roads and pavements due to the potential risks. If they do this inadvertently accidents happen. The barrier methods of separating children from risk in these cases are essential.

The analysis of other events demonstrated in this research show that given thought many accidents could have been anticipated and prevented. This has been acknowledged by all but one of the reported cases. The one case where this was not accepted demonstrates how important it is to educate all concerned about the possible consequences of an action. This point relates to the discussion in the literature on a better understanding of child development.

Whether an activity is work or play is difficult to determine. Two of the accidents cited involved feeding animals in fields, an essential task. However this should be seen as different to feeding a domestic pet or a chance to feed an animal in a zoo as a member of the public, which would be a much more contained situation. It seems the tasks undertaken in the study were work related but helping an adult. It does not automatically follow that adult involvement produces positive learning outcomes. The feasibility of the task again hinges on the risk assessment, however livestock of any sort are unpredictable and can be dangerous.
5.2 Zoonoses

The three zoonoses cases examined in the analysis were all different in their origin, yet two affected the skin and one the alimentary tract in the patient. In all cases a greater awareness that there are risks of infection which can be passed from animal to man is important. Individuals should be more aware of the interventions that can at least guard against such transmission.

5.3 RECOMMENDATIONS

From the conclusions available as a result of this study some recommendations emerge and these correlate with the findings of the literature review, published as a separate document. Risk is a fact in life. A headmaster once expressed the view in a speech

“if we wrap our children in cotton wool they will choke on it”

(Stockdale 2002).

‘Risk trade-off’ is mentioned by Graham and Wiener (1995, cited in Ball 2002). The theory here is that as one aspect is made safer another becomes unsafe owing to lazy behaviour on the part of the operator. The example given is safety caps on medicine bottles, it is suggested this has encouraged leaving the whole medicine chest unlocked.

“It may be perhaps a plausible belief that children should be gradually exposed to real risk, rather than shielded until such time that they are plunged into the mayhem of the normal world.”

(Ball 2002)

➢ Separation

Barriers for young children are essential. Self-closing gates with latches that children cannot manage to open are the obvious item. Children can be strapped into pushchairs or prams if they must be taken outside but they should not be left unattended. They should be cared for as children, either in the house and garden or away from the farm at suitable childcare facilities. Such facilities should be encouraged to meet the needs of the farming populations with provision during unsocial hours, evenings, weekends and most importantly school holidays. The economic climate in farming today requires that this care must be affordable and subsidised to this sector of the community.

➢ Training

Farmers need more support from the HSE or another advisor on health and safety matters. The farmers and their workers need to be convinced that there will be no recrimination for seeking advice. There is a source within HSE of valuable information and experience on which to draw. The advice must be realistic and cost effective. What price a life? It is very difficult for farmers to judge what to spend and even the most sophisticated devices do not always avert disaster. However it is likely that the present economic position will have a deleterious affect on safety investment, unfortunately. More must be done and it should be disconnected from inspection and legislation at least in the first instance.

➢ Information

As the child gets older and able to understand simple instructions then these can be used as part of the means of separating the child from the hazard. Children often respond more if they
understand why they are being asked to behave in a certain way. The following points can be made in this regard:

- First identify the hazard as it will affect those around, for different ages and persons there may be a difference in this process.

- Explain to children what is involved in the situation, what can so easily go wrong and if possible demonstrate in a dummy situation.

➢ Adult Understanding of Child Development

Adults need much more help to understand the development of children and that this is a combined process of physical growth and mental acuity. Each child is an individual and they all grow and develop at different rates. Height does not necessarily equate with strength or reasoning. Mental capacity does not reflect strength physically. Children are not mini adults; they do not respond to instruction or identify hazards in the same way as one might expect of an adult. However this does not mean that suitable methods of managing this difference cannot be employed. It is suggested that children move through several developmental stages and that each stage is characterised by an underlying set of competencies determining what can and cannot be understood.

Adults must also be aware that children employ imaginative play and copy situations that they see. Good role models are important. Children need to see adults exhibiting desirable behaviours. Sometimes children take their role models from unrealistic fantasy examples of behaviour. This is healthy as long as the fantasy is turned off before harm can result. The adult knows that wearing Superman’s Cape will not prevent injury, should the child believe he can safely jump from the wall, for example. In some cases this is not understood automatically by the child, they may need help from the adults who must cue into the child’s world (Tassoni 1999).

➢ Children - Their Cognitive and Physical Growth

Very young children cannot conceptualise time, demarcation is usually represented by a recognisable action such as teatime or bedtime. They live in the moment and their recall is for short-term memory events. As they become older this capacity to follow instruction and recall past experiences develops, they are less easily distracted and have a greater respect for other peoples opinions and motives. By the age of eight they have an overview of the situation which can put a single event into a context of the whole.

Piaget said,

“\textit{It is through biological maturation and active exploration that children develop the power of logical thought. Through experimenting they construct concepts and learn gradually to apply them to new situations. How successfully a child does this is largely of the child’s mental readiness. Parents and teachers supply the necessary materials or situations and the child through problem solving mechanisms increases in knowledge and skill.}”

cited by Lansdown and Walker (1991, p378)

Piaget (1896-1980) urges the encouragement of activity in children and suggests the more involved they are the greater the progress made. His perception, that children are not merely vessels to be filled with knowledge but active experimenting and learning individuals who manage best from experience, continues with educationalist in present times. Vygotsky (1896-1934, cited by Tassoni et al 1999) a Russian psychologist supported the theories of Piaget but
believed in the role of language for learning. He saw the child as an apprentice learning with the help of sensitive adults through language. The psychologist Bruner (1915, cited by Tassoni et al 1999) believed that learning was like scaffolding, adults helped to provide a route to the top, for the child. The views of these three eminent psychologists are valued today in the structure of education for children (Tassoni et al 1999).

This appears to form a valid basis for the work on matching the activity to the ability of the child and according to the Marshfield research in the USA can be utilised profitably in the reduction of accidents, not by stifling activity but by choosing more wisely that which can safely be accomplished. To facilitate the process adults are encouraged to utilise materials provided on the internet and in other learning packages to help them relate to children and the tasks with better understanding.

➢ **Experiential Learning**

Stutz (1999) advises that if children learn to take small risks in small situations they are less likely to get involved in serious ones later, because they have learnt through experience to know what to expect and to look after themselves. This theme was first identified in the ideas presented by Piaget. Adults should be the facilitators of learning for children. In this context risk must be estimated but development should not be stifled. The experiment should be safe, within the capability of the child, and supervised by experienced and probably qualified personnel. This applies to the teaching in schools, outdoor pursuits and respectfully suggested by the author to farming, the theme proposed in the Marshfield Project is cited as an example.

Crucial Crew is the title of one of many initiatives helping in parts of the UK countryside to allow this experiential learning to take place, within suitable and controlled situations. The advantage is that the message is ‘live’ and real for the child to conceptualise. The work in this area with contributions from a range of experts offers a very positive method of delivering safety messages, however there are not sufficient places to meet the demand.

➢ **Technology and Interactive Learning**

The massive sales of computer technology, embracing the games industry, is testimony to usage. Children play for long hours on games technology

"the prevalent picture of child computer use was one of games player".

Furlong et al [2000 2001]

Children enjoy games such as the thrills and spills of catastrophes associated with fantasy in war and the racetrack. This relates to the need and benefits associated with the provision of dummy situations mentioned in the section headed ‘Information’ earlier in this chapter. There would appear to be scope for the development of software packages for interactive learning about safety, particularly farming. Children can actually find out the result of falling from a tractor, turning one over or putting their arm in a baler realistically without the actual harm. Children play with trains on the computer, why not play at farming in the same way? There is also scope for this type of facility in the schools within the curriculum.

➢ **Engineering and Innovation**

Machinery with moving parts must be guarded and those guards should remain in place while the machine is in use. It is an offence for this not to be so, however everyone knows of examples of
repairs carried out in haste and guards not put back due to shortage of time or ignorance. In farming the most dangerous moving part of this nature is the power takeoff shaft (PTO) and this has been responsible for many horrendous injuries to adults as well as children. Grain augers cause similar problems. A method that prevents the use of an unguarded part which remains tamper proof should be possible.

➢ Legislation

Legislation has provided the HSE with powers to inspect, make recommendations, give warnings and enforce, through a series of penalties via the courts, that which it is believed to require correction. This report has recognised the ultimate importance of this arrangement but arguably it should be the last defence after the implementation of all the other initiatives and recommendations.

Apart from enacting present legislation a review of the available legislation is believed to be essential. One example of the law relating to tractor driving or riding states that at thirteen years this is possible. This legislation dates originally from 1958, (reviewed in 1998) and an examination of the power and capabilities of the modern tractor would suggest the law is no longer suitable for the demands of modern times.

➢ SUMMARY

The headings used above listed here are as follows:

1. Training
2. Information
3. Adult Understanding of Child Development
4. Children - Cognitive and Physical Development
5. Technology and Interactive Learning
6. Experiential Learning

All six points have a theme within them, the passage of information. However more is needed, it is the recognition that more than just telling people what to do is necessary. It is vital to respond to questions, deal with ‘why’ and check that the learning has taken place. Young children learn through play and the medium of play has the scope to educate.

The whole process must be appropriate to the needs of the user group, be pleasurable and if possible fun, to this end points five and six from the list above appears to be the most attractive and have the capability to manage the remaining points one to four.

The recommendations suggest that possibilities exist within the National Curriculum to teach children hazard awareness and safety procedures. Many will argue that the National Curriculum has too many demands made upon it already and that adding to them is impossible. It is believed that many of the desirable messages can be delivered through the vehicle of other subject areas, for example science, technology, art and English. It would be advantageous if suitable learning materials could be prepared for teachers to use.
CHAPTER SIX

FURTHER RESEARCH

It has been evident during this project that the expected quantity of data, revealing the extent of farm accidents and zoonoses to children under sixteen years, was not yielded by the chosen methodology. This has been discussed in Chapter Four and some of the findings reported in that chapter suggested that a better way of collecting information must be designed and utilised.

6.1 Critique

A critique of the study aiming to establish the quantity and nature of farm accidents and zoonoses in children.

The majority of these events, under the headings of accident or zoonoses, have been investigated by a medical professional. Innovation in the type of information collected at this point is essential. This is a vital opportunity to analyse the factors involved, without which lessons cannot be learned and recommendations for changes cannot be designed.

The questionnaire, designed for this study demonstrated a capability to collect some useful background information about the incidents in question. The researcher identified that where hospital records were concerned the lack of information collected meant that the background to the event remained invisible. Therefore the events which have been attributed to farming or the countryside may be just a snap shot of the actual number of events, the total being unknown. If this is the case the research has not achieved fully what it was designed to do. This does not devalue what has been achieved, as to prevent incidents we do not necessarily need to know how many there have been in the past, but how to prevent any of the incidents in the future. Understanding the risk and taking action to decrease that risk is a vitally important aspect of any project.

6.2 Future Research

Technology is now so advanced that great opportunities exist to collect the required detail much more easily and importantly, to analyse a possibly vast amount of information. The information must inform, be comparative and available to those who responsibly should have access to it.

Existing arrangements, to collect detailed information about the circumstances surrounding an incident have not been comprehensively structured, when patients present for help either at their own doctors or a hospital setting. To collect such data would be possible as long as the system was designed to do this at the first point of contact with the patient. Analysts must make sure the questions are asked, and the information they require is captured at this point, as retrospective information requests to the NHS computer systems are not possible.

Another important aspect of compatible and comparable research is the classification of the fields of data, for example the age bands that information is collected in. It cannot be comparative if one organisation collects data on children up to sixteen years, another to nineteen years and yet another to twenty-one years. Much better definition is needed and there is a need to determine the end of childhood at a defined age for statistical purposes.

Technological systems must also be installed with the means to be able to “talk to each other”. Sadly
in the National Health Service (NHS) this does not seem to be the case, to date.

A clear recommendation of this report has therefore been to develop appropriate structures for the collection and sharing of information between health care service providers.

Two other more specific research areas also flow from this study:

1. Psychosocial research into family constructs within the working, farming family and the beliefs about the capacity of children to share in the farming activity would provide useful background. (Boyce and Sobolewski, 1989).

2. It is also suggested that the views of the children will provide useful insight (Susa and Benedict 1994).
ACKNOWLEDGEMENTS

Although the views finally expressed in this report are those of the author, the analysis and formulation of these ideas has been greatly assisted by discussions held regularly with the steering group comprising

Mr G. Walker - Health and Safety Executive
Mr I Monkton - Transport and General Workers Union
Ms. L. Wise - National Farmers Union
Professor P. Midmore - University of Wales, Aberystwyth
Mr B. Boyle - Ceredigion and Mid Wales NHS Trust
Dr D. Thomas - Public Health Laboratory Service
Mr J. Corkish - Veterinary Laboratory Agency
Dr A. Evans - General Practitioner
Ms. Jane Randall-Smith, Chief Executive, Institute of Rural Health

Special thanks is due to the Research Manager for supporting the researcher during this project Dr J. Deaville at the Institute of Rural Health.

General practitioners in thirty-five practices in England and Wales contributed to this study with their willingness to collect data. They were from areas in Herefordshire, Shropshire, Cumbria, North Yorkshire, Cambridgeshire, Norfolk, Lincolnshire and Dyfed Powys. These areas were selected on the basis of their geography, topography and the nature of the farming activity.

Many other individuals, organisations and agencies have contributed information to inform this study.

To all of those who supported this project grateful thanks is extended.

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Powys
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www.rural-health.ac.uk
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Information in the public domain accessed from:
www.statistics.gov.uk
www.defra.gov.uk
www.dti.gov.uk
APPENDICES
ADVISORY GROUP

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Ms. L. Wise - National Farmers Union
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Mr B. Boyle - Ceredigion and Mid Wales NHS Trust
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Dr A. Evans - General Practitioner
Ms. Jane Randall-Smith, Chief Executive, Institute of Rural Health
Dr J. Deaville, Research Manager
FARM CHILD UK

A SURVEY OF AGRICULTURAL INJURIES AND ZOONOTIC DISEASES IN CHILDREN
(Finalised)

Co-ordinated by the Institute of Rural Health

IN THE STRICTEST CONFIDENCE

This data will be held according to the provisions enforced by the Data Protection Act (1998) and will be held in the strictest confidence. Individuals will not be identifiable from this questionnaire, or the information yielded as a result of the survey.

If the patient refuses to provide consent for the completion of the questionnaire please tick the box ☐

and submit the document to the researcher.

GP CASE NO CONSENT OBTAINED
☐ ☐YES
SECTION A. PATIENT INFORMATION

1. GENDER: Male Female

2. AGE: yrs...... Mths......

3. Is this patient registered with the practice? Yes No

4. Does the patient live on the farm where the accident / illness occurred?
   Yes No

   If no go to question 4b

4a If yes, what is the relationship?
   Son Daughter Nephew Niece

   Other (Please give details) .................................................................

4b If no, why was the patient on the farm? (Select one of the following relevant to the patient).

   Independent farm visitor. Farm child’s friend.
   Countryside pursuit. Farm workers child.
   School, playgroup or nursery visit. Family holiday.
   Organised farm visit Other (Please give details)............

5. Type of farming enterprise where incident / illness occurred.
   (Please circle one)

6. Mixed stock and arable Pig Unit Poultry Unit

   Mixed cattle and sheep only Dairy Unit Beef Unit
   Sheep Unit Arable only Horticulture

   Other (Please specify).................................................................

   Less Favoured Area (LFA) Site of Special Scientific Interest (SSSI)

6. Is this being recorded as

   A farm accident □ then go to section B   A zoonoses □ then go to section F
SECTION B    CIRCUMSTANCES OF FARM ACCIDENT

Please supply as much information as possible.

7. DATE OF ACCIDENT…………………………….

TIME OF ACCIDENT ……………………………

8. WEATHER CONDITIONS and VISIBILITY (you may circle more than one).
   Dry       Wet       Windy       Calm       Foggy
   Snow/Ice   Misty / Foggy   Clear
   Daylight   Dusk       Dark

9. LOCATION (you may circle more than one).
   Own (Family/Parent’s) farm   Another Farm   Farm Road   Council Road
   Livestock Market   Field   Forestry Land   Moor Land
   In Building   Other (Please give details)

   …………………………………………………………………………………………………………………………………………………

10. TERRAIN (you may circle more than one)
    Hard surface   Mud       Rocky       Loose material
    Grass       Soil       Water    Other (Please give details)….

NOW PLEASE GO TO SECTION C
SECTION C. TYPE OF INJURY

11. Please select one or more of the following injuries as appropriate or select ‘Other’ and provide details. The injury types are listed alphabetically for your convenience.

ALLERGIC RESPONSE ILLNESS (Please circle)

- Rash
- Respiratory Difficulties
- Headache
- Swelling
- Other (Please give details) …………………

BACK INJURY (Please circle)

- Muscle
- Bony
- Disc
- Cartilage
- Other (Please give details) ……………………………………………………………………………………

BITES (Please circle more than one if necessary)

- Upper Limbs
- Head, Face and Neck
- Lower Limbs
- Torso
- Hands
- Fingers
- Feet
- Toes
- Other (Please give details) ……………………………………………………………………………………

BONY INJURIES (Please circle type and location)

- Type
  - Simple
  - Complex
  - Compound
  - Greenstick
- Location
  - Upper Limbs
  - Face and Neck
  - Lower Limbs
  - Torso
  - Hands
  - Feet
  - Back
  - Ribs
  - Skull
  - Other (Please give details) …………………

BURNS INCLUDING CHEMICAL AND SCOLDS (Describe type)

DROWNING

Describe type …………………………………………………………………………………………

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ELECTRICAL INJURIES

Describe type

EYE INJURIES (Please circle)

Foreign Bodies Flash Burns Chemical Splash
Blow to eye Penetrating Cut to Eye Tissue.
Single eye Both eyes Other (Please give details)

FACIAL INJURIES INCLUDING TEETH.

Describe type

HAND INJURIES (Please circle more than one if necessary)

Cuts Bruises Fractures Penetrating Crushing
Infection Nail damage Amputation (full, part, digit(s) state number)
Other (Please give details)

Involving preferred hand Yes No (Please circle)

HEAD INJURY (Please circle more than one if necessary)

Cuts Bruises Fractures Loss of consciousness
Other (Please give details)

MUSCLE AND TENDON INJURIES (Please circle more than one if necessary)

Strains Sprains Cut or severed
Upper Limbs Lower Limbs Trunk and Back
Other (Give details)
POISONING  (Please select by circling and by providing further detail)
Farming Products   Veterinary Products   Gardening / Greenhouse Products

SKIN INJURIES  (Please circle more than one if necessary)

Types of injury
Grazes   Abrasions   Lacerations   Puncture Wounds
Severe Cuts   Wound with Foreign Body   Bruising
Other  (Please give details)………………………………………………….

Location of injury
Upper Limbs   Face and Neck   Lower Limbs   Torso
Hands   Fingers Feet   Toes
Other  (Please give details)………………………………………………….

Please give details of any other injury which you do not feel is adequately or appropriately listed above.

PLEASE NOW COMPLETE SECTION D
SECTION D.  CAUSE OF INJURY.

12. Please circle as appropriate the situation which best explains the cause of the accident.

ANIMAL RELATED INJURY

Animal Type (Please circle)

Cattle  Bull  Steer  Cow  Calf
Dog  Working  Domestic
Horse  Mare  Stallion  Gelding  Foal
Pig  Sow  Boar  Gilt  Piglet
Poultry  Hen(s)  Cockerel  Ducks  Geese  Other (Details please)
Sheep  Ewe  Tup  Lamb

Other Animal (Please give details)...........................................................................

Location where the incident occurred. (Please circle)

Fields  Cubicles  Stable  Building
Penning  Market  Stock Trailer  Yard
Stock Lorry / Wagon  Other (Please give details)

BALE RELATED (Please circle)

Types

Hay  Straw  Silage  Other (Please give details)

Size

Small rectangular  Big square
Small round  Large round

Location

Moving on loader  Moving on trailer  In stack
Other (Please give details).......................................................................................
### FALLS

**Involving Height (Please circle)**

<table>
<thead>
<tr>
<th>Tree</th>
<th>Stacks</th>
<th>Buildings</th>
<th>Ladders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Machinery
- Rotten Flooring
- Tractors or similar
- Trailers
- Silos
- Other (*Please give details*)

Please estimate the height of the fall.

### Involving Ground Surfaces (Please circle)

- Slipping (*Please give details*)
- Tripping (*Please give details*)
- Other (*Please give details*).

### GRAIN RELATED

**Place (Please circle)**

<table>
<thead>
<tr>
<th>Silo</th>
<th>Pit</th>
<th>Lorry</th>
<th>Store</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Other (*Please give details*)

### MACHINERY RELATED INJURY

*(Select with a circle which machinery was involved in the accident)*

<table>
<thead>
<tr>
<th>Tractor</th>
<th>Trailer</th>
<th>Power Take Off Shaft</th>
<th>Bail</th>
<th>Combine Harvester</th>
<th>Silage Chopper Lorry</th>
<th>Car</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Potato or Beet Harvester
- Quad - All Terrain Vehicle
- Landrover or Similar
- Drawbar
- Other (*Give details*)

### Direction of travel (Please circle)

- Forward Motion
- Turning
- Reverse Motion

### MOVEMENT RELATED

- Running
- Walking
- Jumping
- Skipping
- Lifting
- Twisting
- Bending
- Other (*Please give details*)
POISONING (*Please select*)

Farming Products
Veterinary Medicines  Spray Products  Fertilisers
Weed killers  Pesticide  Fungicide  Other (*Please specify*)……..

Gardening / Greenhouse Products
Fertilisers  Weed killers  Pesticide  Fungicide
Other (*Please specify*)…………………………………………………………

SILAGE (*Please circle*)
Making in field  Making in pit  Making in silo
Covering  Sheeting  Tyres or weighting
Other (*Give details*)…………………………………………………………

SLURRY

Cleaning out (*Please circle*)
Scrapers automatic  Scrapers tractor driver
Other (*Please give details*)……………………………………………………

Falls into (*Please circle*)
Pits  Towers  Muck Spreaders
Other (*Please give details*)……………………………………………………

STRING (*Please circle*)
Tripping  Ankle Wrapping  Other (*Please give details*)…

TOOL RELATED
Screwdriver  Hammer  Sledge hammer  Nail
Hand Saw  Chain saw  Bench Saw
Clippers  Shearing machine  Gas cylinder
Syringe and needle  Multiple injector  Other (*Please give details*)…….
WATER RELATED INJURIES (Please indicate type)

Slipping on Surface Water

(Please describe).................................................................................................................................

Falling Into (Please indicate type)

Water Tank Water Trough Water Butt Pond Natural

Pond Ornamental Other Please give details).................................................................

WHEELS OR TYRES (Please circle one option)

Fell on patient Ran over patient Injured part (please specify)

OTHER CAUSE OF INJURY OR ADDITIONAL INFORMATION (Please give details).................................................................................................................................

NOW PLEASE GO TO SECTION E
SECTION E  PREVENTION

To help identify any preventative strategies could you consult the patient and answer the following in the most appropriate manner.

13. Was the victim playing when the accident occurred?  □ Yes  □ No

14. Was the victim helping / working at the time of the accident?  □ Yes  □ No

15. Could the accident have been anticipated?  □ Yes  □ No

16. Was the victim in a location inappropriate for them?  □ Yes  □ No

17. Had equipment been modified in any way?  □ Yes  □ No

18. Was contract labour involved?  □ Yes  □ No

Please offer any other detail that would be useful to help prevent this accident in the future.

NOW PLEASE GO TO SECTION G

SECTION F  ZOONOTIC DISEASES

(An animal disease transmissible to humans).

If a patient presents with an illness which you SUSPECT may be connected with living, working on or visiting a farm. Please supply as much information as possible especially when your opinion has not been substantiated by laboratory tests.

19. Date of first onset of illness?  ………………………………………………………………………

DIAGNOSIS

20. Please select a suspected condition or provide other information where you are not sufficiently sure of the diagnosis.

SKIN CONDITIONS (Please circle)

Orf  Ringworm  Impetigo  Scabies

Other (Please describe)……………………………………………………………………
ZOO FLU’S  (Please select a condition with a circle)

- Ecoli 0157
- Salmonellosis
- Other (G.I. symptoms)
- Campylobacter
- Cryptosporidiosis
- Lyme Disease
- Leptospirosis (Weils) Disease
- Tuberculosis
- Histoplasmosis
- Hydatidosis
- Others (Zoo Flu Type)
- Psittacosis (related to keeping birds, ducks, and poultry)
- Q Fever (may lead to pneumonia)

21. Please provide as much clinical detail as possible to assist researcher with classification of the condition……………………………………………………………………..

22. Any other illness which is suspected to be farm related which has not been suggested above (Please give details)……………………………………………………………………..

Laboratory test proven  □Yes □No

Name of laboratory .................................................................

Details of tests requested ..........................................................

NOW PLEASE GO TO SECTION G

SECTION G  MANAGEMENT OF ACCIDENT/ILLNESS

So that information about the treatment and management can be analysed please circle the following where appropriate.

23. TREATED BY (you may circle more than one)

- GP
- Nurse
- Physiotherapist
- Other (Please give details)…

24. PLACE OF TREATMENT

- GP Practice
- Community Hospital
- At the scene
- A&E Casualty
- Other (Please give details) …………………………………………………..

25. ADDITIONAL TESTS (Please give details)

- Laboratory
- Other (Please Specify) …………………
26. **DISCHARGE OR REFERRAL** *(Please circle)*

- Discharged
- Further GP care
- Outpatient Care
- Clinic or departmental care *(Please Specify)*
- Other *(Please give details)*

27. **ADMITTED TO HOSPITAL** *(Please circle)*

- Community Hospital
- District General Hospital
- Regional Hospital
- Other *(Please give details)*

**SECTION H ADDITIONAL INFORMATION**

28. The classifications built into this questionnaire have been designed to facilitate completion. However it is appreciated that sometimes a situation cannot be classified or you would rather have freedom to write as desired. Where there is additional or specific information please use this space.

Thank you very much for completing this questionnaire. Please thank the patient on behalf of the Institute of Rural Health and reassure the patient and their family of confidentiality and anonymity. Encouragement to complete the follow up questionnaire and the return of it to us, in the envelope provided, would be appreciated.

WE WISH THE PATIENT A SPEEDY RECOVERY!

Administration only.

HA. GP. Research No
FARM CHILD UK

Please complete one month after the accident or illness

To assist with the research the Institute of Rural Health would be very grateful if you as the patient, or your Mum, Dad or other appropriate person could answer the following questions and return the form, in the stamped addressed envelope, which your doctor will have given you. Confidentiality and anonymity is assured at all times.

GP SURGERY TO COMPLETE BEFORE THE PATIENT LEAVES THE SURGERY.

DATE OF ACCIDENT /ILLNESS Research No

Please hand to patient with envelope for them to take away with them.

PATIENT TO COMPLETE

TODAYS DATE

Did you recover at home?  Yes  No

Were you admitted to a hospital at any time?  Yes  No

If yes circle one of the following: Local community hospital A bigger one

A very big one away from where you live.

Did you have time off school or work? Yes  No

If yes please indicate how long for:-

Are you now fully recovered? ☑️ ☹️

(If no please supply details of the problems encountered during and as a result of your accident or illness).

What is expected for the future? Continue over the page if necessary.

Do you have anything else you would like to add to provide this survey with useful information to help protect others? …………………………………………………

Thank you for taking the time to deal with this. It is anticipated that this research will help in the prevention of accidents and illnesses to children that are farm related.

Best wishes
Lesley Jones - Research Co-ordinator - Farm Child UK
Research Reminder

~~~~~~~~~

Preventing Accidents & Zoonoses

Farm Child UK
Gregynog Hall
Newtown
Powys
Sy16 3PW

Y Tir & Welsh Farmer, Aug 2001
REMEMBER

FARM CHILD UK

Accidents / Zoonoses

WARM WEATHER, LAZY DAYS
IDEAL CONDITIONS
FOR
GUT BUGS PROLIFERATION

Lesley Jones
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GLOSSARY OF TERMS

Abortion  Lose of foetus before it is mature enough to survive outside the womb.

Aerosols  Fine particles in the air.

Amputation  Removal of part of the body by surgery or accident

Anaerobic  Living or reproducing in the absence of oxygen

Anaphylactic shock  Severe allergic shock which may cause death.

Antibody  A protein substance called an immuno globulin produced in response to an antigen.

Asphyxia  Suffocation or interference with a free airway.

Avulsion  Forcible tearing off of part of the body.

Cognitive  Faculty of knowing and understanding.

Colitis  Inflammation of the colon.

Concussion  Temporary lose of consciousness

Contusion  Bruise.

Dislocation  Separation of the bearing parts of a joint.

Endocarditis  Inflammation of the inner linings of the heart and valves.

Enteric  Pertaining to the small intestine.

Epidemiology  Study of the source and nature of disease.

Epizootic  Affecting a large number of animals in a short period.

Experiential  Learning by experience.

Fomites  Anything which has been in contact with infection and can transmit it.

Foreign body  Something not of the body which has invaded it.

Fracture  A break of the bone.

Gastro intestinal  Of the stomach and intestines.

Grain bin  Tall tower for storing grain usually with doors at a lower level.

Guard  A barrier or protection from contact with moving parts.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tr>
<td>Haematoma</td>
<td>A leakage of blood from a damaged vessel into muscle or under the skin.</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>Inflammation of the liver</td>
</tr>
<tr>
<td>Immuno suppressed</td>
<td>Depressed or lowered immune function due to medication.</td>
</tr>
<tr>
<td>Laceration</td>
<td>Cut</td>
</tr>
<tr>
<td>Medication</td>
<td>Prescribed or purchased medicines</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Illness</td>
</tr>
<tr>
<td>Mortality</td>
<td>Death</td>
</tr>
<tr>
<td>Muck spreading</td>
<td>Spreading of animal faeces and bedding on pasture or the soil.</td>
</tr>
<tr>
<td>Pathogenic</td>
<td>Disease causing organisms.</td>
</tr>
<tr>
<td>Physical</td>
<td>Height to weight ration (in this sense referred to in this study)</td>
</tr>
<tr>
<td>Power take off</td>
<td>Distribution of power from a tractor to a machine being towed to mechanise it.</td>
</tr>
<tr>
<td>Primary care</td>
<td>Care provided at the first level - a General Practitioner.</td>
</tr>
<tr>
<td>Ruminant</td>
<td>Cud-chewing animal.</td>
</tr>
<tr>
<td>Sero prevalence</td>
<td>The prevalence in numbers of a serotype antibody.</td>
</tr>
<tr>
<td>Serology</td>
<td>The investigation of the serum in blood.</td>
</tr>
<tr>
<td>Set aside</td>
<td>Land not actively farmed</td>
</tr>
<tr>
<td>Sheep dip bath</td>
<td>A pit of water and chemical for the purpose of immersing sheep to kill infestation.</td>
</tr>
<tr>
<td>Silo</td>
<td>A tower to hold animal feeds or silage.</td>
</tr>
<tr>
<td>Slurry</td>
<td>Liquid faecal and urine waste from cattle or pigs in housing and pits.</td>
</tr>
<tr>
<td>Toxin</td>
<td>Any substance produced by a living organism that is poisonous to another living organism.</td>
</tr>
<tr>
<td>Uraemic</td>
<td>The accumulation of nitrogenous waste products of metabolism in the blood as a result of renal failure.</td>
</tr>
<tr>
<td>Vector</td>
<td>An insect or animal capable of transmitting an infection to another by allowing the organism to multiple within it but not succumbing to infection itself.</td>
</tr>
<tr>
<td>Welding</td>
<td>To unite metal with heat generated using electric arc or gas.</td>
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<tr>
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<td>Diseases transmitted from vertebrate animals to man.</td>
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Raising Their Status Creating Awareness

A literature review of the nature and incidence of accidents and zoonoses affecting children as farm residents and also users of the countryside.

PART II

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A review of the available international, national and local literature that discusses accidents and zoonoses (diseases transmissible from vertebrate animals to man), which are related to the agricultural environment and the countryside and concerns children under the age of sixteen years.

The incidence and the nature of the event is of relevance in endeavouring to understand the circumstances of these events, and to developing avoidance strategies based on the findings of other studies.

In this review there are two sections: the first examining the literature related to accidents and the second concentrating on zoonoses.

Zoonoses are explored in separate themes of gastric and intestinal, skin, and respiratory infections under the names of the conditions.
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SEARCH METHODOLOGY

The available literature relating to farm accidents and zoonoses affecting children has been sought. As the study affected those other than just farm resident children it was important to consider documents reporting incidences which occurred due to a more general use of the countryside which included leisure pursuits and educational activities.

It was felt important to access literature on a world basis but in reality materials from the USA, Canada, Australia, Scandinavia, Poland, France and the United Kingdom predominated.

Searches were restricted to the last ten years although if anything particularly relevant to the present time materialised which was older, it was reviewed to determine suitability for inclusion.

There was some difficulty in determining a definition of what constitutes a child; for the purposes of the data collection in this study this had been defined as under sixteen years. Different countries have a range of criteria for the classification of a child. Fourteen years was particularly relevant for the USA whereas eighteen years and twenty years were referred to by other countries, when describing incidents affecting children. Therefore comparisons of the data were impossible between countries.

Again enumerative material is recognised as inaccurate by many statistical departments due to under reporting of both non-fatal accidents and zoonotic episodes and further, laboratory evidence confirming zoonoses in many cases is missing. Cases of symptomatic illness, possibly attributed to zoonose, recover spontaneously without recourse to medical advice. Other cases attend for medical advice and are treated in accordance with presenting symptoms, and unless recovery is delayed, no further evidence as to the exact nature and causative factors of the disease are elicited. Therefore confirming zoonosis can be fraught with difficulty.

Comparisons are therefore impossible if denominators and numerators are not standardised and if large sections of possible data fail to reach recording mechanisms.

Databases

Internet access to the databases of Medline, Cochrane and the British Medical Journal (BMJ) produced useful documents.

Internet Searches

Searches were conducted using key words of accident, zoonoses, with and without the prefix child or farm. Individual searches using the actual disease names were conducted for the zoonoses named in the research questionnaire document.

Government Departments

Actual data, collected by Health and Safety Executive (HSE) and Reporting of Injuries, Diseases and Dangerous Occurrence Regulations (RIDDOR) where available was accessed when drafting present knowledge. Statistics collected on disease control from the UK using the Public Health Laboratory Service (PHLS) and Centres for Disease Control in the USA have been approached and monitored.
Other

Sources revealed as useful from academic institutions, accredited published papers and centres of excellence were actively traced and utilised where appropriate.

Voluntary Bodies and Organisations

In some countries there is considerable activity for accident reduction from interested action groups who conduct their own research and implement interventions deemed appropriate. Where traced these have produced useful information to inform this study.

Peer review literature suggested other sources and relevant documents. These were traced using the document referencing to yield other useful papers.

Where considered valuable, grey literature was included if a justifiable contribution to the study could be made.
CHAPTER ONE

INTRODUCTION

Farm Child UK is a prospective quantitative study designed to collect data from primary care providers (general practitioners) and also a retrospective qualitative study interviewing farming families with children lasting sixteen months in total. The latter is an extension from the original twelve month period of prospective quantitative data collection designed for this study. The farming year is important as many diverse activities occur at specific times of the year and different risk factors are associated within them. Within the calendar year the nature of activities undertaken by people will be different. The study wished to encompass as much as possible of these diverse activities and includes accidents to children and episodes of zoonotic infection concerning children.

Unfortunately the countryside in the UK was to a large extent affected by Foot and Mouth disease, just as the study commenced. Research by Deaville and Jones (2001) shows the affects the disease had on the use of the countryside and farm life in particular. This alteration to normal practices must be recognised as compromising the expectations for data yield. Spring and early summer was the most severely affected time and visitors to the countryside were virtually nil. Farms closed their gates and the families stayed behind them, not mixing socially and not inviting guests to breach their defences. For this reason it was decided to extend the study by four months and to continue to collect available data but to also add another dimension to the study with the inclusion of qualitative data. It was envisaged that interviews with farming families would assist the understanding of the perspectives held regarding children on farms, their safety and their care needs. Information could also be gathered to assess the place of choice which would be selected by parents and carers of children should they have had the need to seek medical assistance for a child in the event of accident or illness. This data, once analysed, would provide knowledge regarding demands placed on primary care services in connection with accidents and zoonoses affecting children and on how frequently secondary care services, via accident and emergency departments, which in many cases may be some distance from the farm residence, would be chosen as the route to assistance.

To locate this study in the wider picture a review of available literature follows. Much of this literature is from sources within the USA where it seems there are a number of initiatives working to understand the problems associated with the agricultural industry and the safety of all involved. It seems that published work for the UK and Europe as a whole is not extensive but where located it has been utilised. The following literature review has considered the United Kingdom’s position within research conducted in the wider world where in every case farm accidents and zoonoses are viewed as a problem, frequently resulting in unnecessary or preventable death and injury.

1.1 BACKGROUND

RAISING THEIR STATUS: children, their safety and health in the countryside.

Life on a working farm is not complete pastoral serenity. Fatigue, time pressures and malfunctioning equipment combine with frequent inclement weather and dark nights to make farming a most dangerous occupation (Sterner 1991).

The agricultural sector in the USA averages one fatal injury to a worker every week from a work force of approximately 3.1 million, and one to a member of the public every month (May 1990). Those farms employing less than eleven workers remain outside the jurisdiction USA Government legislation as the Occupational Safety and Health Administration (OSHA) do not have jurisdiction in these small family enterprises. Strueland and Lee et al (1996) found that one third of agriculturally
related accidents to children occur when they are merely observers. The Child Accident Prevention Trust (1998) in the UK, using the Department of Trade and Industry's latest leisure and accident surveillance data, produced figures for accidents in farm, farmyard, barns, cultivated fields and golf courses which have affected the age group 0-15 years at two hundred and fifty-seven incidences for their research published in that year. Figures for non-fatal accidents suggested by the HSE data for the years 1994–2000 can be viewed in Section 1.3, Table One.

The type of risk exposure affecting farming families is recognised and the following quotation provides the perspective.

“Farmers health may also be affected by exposure to highly toxic chemicals, organic dust, zoonotic infections and a wide range of adverse environmental conditions. Furthermore these hazards may extend to farming families and to visitors, whether or not they are engaged in work.”

(Baxter 1992, p 7)

Baxter (1992) continues by pointing out that children under sixteen years show a disproportionate number of disabling injuries and workplace deaths associated with this industry. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) in the UK fail to quantify fully these incidences, as there is a failure to report them either due to apathy, fear of litigation or ignorance on the part of the industry and those working in it.

1.2 PATIENT PREFERENCE AND PRIMARY CARE RESPONSIBILITY

Baxter (1992) notes that general practice in rural areas is the main point of contact for farmers and their families, yet their training to recognise occupational health problems, including the short and possibly the long term effects of exposure to pesticides and chemicals is limited. Further, rural practices could undertake health promotion activities targeted at the needs of the farming families in their areas. Davies and Howell (1988, p192) had advocated this idea suggesting

“the child physician is obliged to encourage education programmes in farming communities on safety measures.”

Steele (1994) noted in a survey on patient behaviour in connection with accidents that 91% of urban patients would present at accident and emergency departments in the first instance, compared with 44% of rural patients who selected their general practitioner as the first point of care. Part of the focus for this author’s study was to evaluate whether attendance at the accident and emergency department was really necessary. Evans (1992) was especially interested in those who attended general practitioners from rural areas with an accident without prior recourse to hospital services. He reports that anecdotally rural general practitioners (GPs) have noted the increased workload and therefore cost of treating accidents. His study found that 75% of accidents could be treated solely at the primary care team premises. There is no resentment in this statement rather the need to recognise the importance of accidents in terms of morbidity but also the cost imposed on the health services. Prevention is preferable to cure, this would be the adage and Davies and Howell (1988) placed some of this responsibility with primary care providers.

1.3 QUANTITY AND SEVERITY

The causation of injury sustained by children on or about farms is not quantified or categorised at the point of treatment and the cause is not usually investigated. However in the case of deaths investigation yields much more explicit detail regarding causative factors. When child accident deaths are compared by cause, farm related incidents are ranked third after road accidents and fires.
(Gaffney and Darragh 1993). Due to lack of information about the numbers of the population likely to have access to agriculture it is impossible to establish whether the percentage of the child population affected by deaths due to an agricultural accident is greater or less than the deaths attributed to road accidents or fires which might be presumed to occur more frequently in urban areas.

Many authors identified in the literature reviewed for this study have noted that mortality is a major concern in rural accidents. Studies in Australia have highlighted this, noting that death from injury is greater in number in rural areas than urban areas. Gaffney and Darragh (1993) noted that in Ireland death occurred at the site of the accident in all but two of the seventeen cases they examined that involved children. They believed that this reinforced the serious nature of such accidents and the importance of expert care at the scene. Factors contributing to this must be in some cases the swiftness of emergency help reaching the patient and the skills available within that help (Sterner 1991). There are implications here for the rural general practitioner who will bear the brunt of treatment service at the location of the accident.

In South Australia between the years 1988 to 1992, 82% of 201 hospitalised childhood injuries resulting from workplace environments were from agriculture and 73% of 37 children admitted with machinery related injury had sustained the accident on the farm. Nationally 847 children were admitted to selected hospitals following workplace injuries. These injuries had been sustained on farms in 83% of cases. Byard and Gilbert et al (1998) documenting their findings in this study felt that there was considerable under reporting as not all information reached the appropriate database.

Wolfendon and Lower et al (1992) in New South Wales, Australia believed that the self-reliant nature of farming families, the distance from services and the timing of injury precluding the seeking of medical attention, contributes to under reporting. The failure of accidents to come to the attention of researchers and statisticians will mean the extent of the problem is not understood; further, any measures to control the situation cannot be initiated due to lack of knowledge. Extensive attempts have been made in Canada by Canadian Agricultural Injury Surveillance Programme (CAISP) to capture the occurrence of accidents however even here this is limited to those who attend hospital emergency services with the injury or fatality.

Non-age specific data gathered in Canada by the Canadian Agricultural Injury Surveillance Program (CAISP) lists agricultural accidents, especially fatalities, as the highest category for risk after mining, logging and the construction industry. Likewise (Schepl 1992) noted that data from injury mortality statistics in Swedish social medicine research places agriculture first as one of the most dangerous industries.

In the United Kingdom, during the last decade, fifty-six children have died as a result of farm accidents, hundreds more have received injuries, many of which are never quantified, a factor highlighted by Baxter (1992). The figures that are available are shown in the following chart but the classifications are slightly changed over the years of collection. Between years 1990 to 1996 data was recorded as fatal or major injury. Since that time data is recorded as fatal or non-fatal. This later category is likely to record more incidents, as it will encompass minor injuries. Even adjusting for this in understanding these figures the increase is disturbing considering the amount of efforts made in recent years to raise awareness of the dangers in this sector. Further it would have been encouraging to see a downward trend prior to the 1996/7 data collection phase as this focused on major injury.
Table One

Nonfatal accidents to non-employed children under sixteen years in the agricultural sector as reported to The Health and Safety Executive (HSE) and local authorities.

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<td>51</td>
<td>53</td>
<td>48</td>
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1.4 THE NATURE OF THE INCIDENT

Falls cause approximately fifty percent of injuries to members of the public, in all age groups, connected to agriculture according to data (HSE 1999-2000) and children are included in this group. This is followed by slips and trips, injured by animals and being struck by flying objects in that order. Data collected in Wales, by Dyfed Powys Health Authority, following admission to hospital, supports the fact that falls account for over fifty percent of farm related accidents in those under sixteen years of age. Mercer draws attention to a review by Gaffney and Darragh (1993) for the period 1984-1988 examining total accidental deaths in Northern Ireland which found that in the case of children the third largest risk was connected to farming. Suffocation in grain bins and silos (Sterner 1991), plus drowning by inadvertently falling into water troughs and butts, acknowledged as posing serious risks to children who once in the situation cannot extricate themselves. Some areas of the country which have deep drainage ditches constitutes further risk as considerable amounts of water can be held in them and they are too deep for a child to climb out (Wilks 1993). Children have a natural curiosity and in particular are inclined towards machinery. Doyle and Conroy (1989, cited by Mercer) found a distinct relationship between accidents and unguarded machinery, water and slurry. Castles (1998) reported on a large number of occurrences concerned with electrical injuries and shock, also the outbreak of fire as a major hazard.

The survey used for the findings of Doyle and Conroy was based on general practice in Southern Ireland. They found 16% (n52) of the cases of farming injury involved children and suggested that they are not aware of their lack of strength, small size, inexperience and immature co-ordination, which will affect their ability to control or extricate themselves from perilous circumstances.

A significant proportion of the victims of accidents are children who live on farms, the CAISP report for Canada cited 13% (n102) out of a total of 901 deaths on farms between the years 1990-98. Those visiting farms or the wider countryside are also vulnerable to injury resulting from accidents connected with the agricultural environment. Figures from Sweden recorded from a twelve month study in 1989 reported 3641 injuries in their study area found that 16% of all the injuries, and 30% of injuries connected to farming but within the home, occurred in children aged 10-14 yrs. Eighty-two percent of the children lived on the farm, however 18% of the children were there only temporarily (Schelp 1992). Again figures relating to fatalities produced by CAISP gave drowning as a significant area for concern and also the recreational use of all-terrain vehicles (ATV’s), often taking place on farm land, but constituting a diversification from the farming business. Visits to farms have increased in recent years for both education and enjoyment and they are organised by families, educational and other outside groups. The public use the countryside for walking, orienteering, camping, picnicking and a vast range of sporting pursuits. The land, unless set-aside in agricultural terminology, will be used for livestock, horticulture, forestry or arable production, even that which has ‘common land’ status is usually grazed by stock.

Many users of the countryside are people from urban backgrounds who welcome the chance to enjoy wide-open spaces and fresh air, away from industrial backgrounds and high-density living. For children this opportunity may be the only time they are able to conceptualise the way animals are
reared for food, to see them in reality, to handle and care for them in some small way.

Serious injury was sustained in all fifteen child cases reported in the study by Vannuville and Corger et al conducted in France, however nine of the fifteen cases met their accident by involvement with a tractor. Other mechanical equipment such as power takeoff shafts (PTO) caused four of the accidents and a chainsaw and brushwood cutter caused two accidents. All of these casualties were admitted to specialist hospitals and transported there by specialist medically assisted transport. Two died after admission.

Two studies in Poland place increased responsibility for accidents on mechanisation listing the following as the machinery causing the greatest concern:

- Potato harvesters - 42 accidents
- Agricultural tractors – 23 accidents
- Straw Cutters - 19 accidents
- Grain Drills – 8 accidents
- Potato combine harvester – 7 accidents
- Manure spreaders – 5 accidents

Other mechanical equipment

- Circular saws - 14
- Chainsaws – 5

This information was collected after the analysis of 841 accidents in Lublin which concerned children on farms under the age of fifteen years (Bujak 1999). The work in other countries is quoted with that of Shenker (1995) who suggests 30% of accidents in this group in the USA are connected to machinery, and that of Erlich (1991) in Australia who claimed 68% attributable thus.

Doyle and Conroy (1989) conducted a prospective study for one year in the Republic of Ireland focusing on farm accidents affecting children and taken to accident and emergency departments. Tractor incidents accounted for 58%, also the longest stay in in-patient care could be attributed to injuries so caused. In this time span sixty-two children suffered injury and four further cases suffered fatalities. The authors point out that many more minor injuries would have been treated by GP’s. They found that 42% of accidents happened in the farmyard and that 92% of the affected were the farmers own children. In the CAISP report 13% (n102) of 901 deaths investigated between 1990-98 were identified as the farmers own child and that those under five years accounted for the greater number within this figure of 102. The highest causative factors are run over as bystander, passenger fell from machine and rollover of machine.

Falls, slips and trips are again cited as a common problem on farms by Casstles (1998) noting during the year 1995-6 data collected on members of the public which visited farms showed that three children fell from a height, four slipped or tripped and one was struck by an object which fell.

This cause of injury is supported, she states, by HSE statistics collected over a longer time period. Virtually every paper explored in this review of literature will have produced tables indicating the nature of activity on farms conducted by children and the injuries likely to have been sustained. They cannot all be replicated but a clear fact emerges, boys are more likely than girls to have accidents and there are peak ages to be affected i.e. the under fours years and the ten to fourteen year age group (Schenker, Lopez and Winternute 1995). This would appear to match the curiosity of the young and the task beyond the years of the older children (Tevis 1994).
The CAISP data identified males (85%) as more at risk than females (15%). They believe non-machinery (n 65/100,000), mainly animal related and falls, are the incidents accounting for the majority, whereas machinery related incidents (n 40/100,000) especially where they concern children, account for slightly less occurrences. CAISP highlight that in children the commonest injury after upper arm injury is skull fractures, inter-cranial damage and lower limb fractures.

In Sweden the evidence points to falls from heights and slips, trips and stumbles on the level being the major cause of accidents in children, being struck by an object, squeezed by an animal or pierced by a foreign body are the second serious injury cause (Schelp1992).

Cogbill and Bush et al (1985) believed when their study was structured that the incidence and severity of child accidents connected with rural environments was poorly documented. It was noted that in the years 1971 to 1976, one hundred and twenty children had died on Wisconsin farms as a result of accidents. They believed there were unique features connected to farm injuries affecting children. A project to study these over a six and a half year period was developed. During this time one hundred and six children were admitted to hospital as a result of trauma connected with farms. Analysis of the cause of these injuries indicated that 40% (n42) were caused by animals, 26% (n28) by tractor and wagon accidents, 20% (n21) by farm machinery, 6% (n6) by falls from farm buildings and 8% (n8) miscellaneous. From the whole group there was one fatality and one major disability resulting from the incident.

The inclusion group were those under eighteen years and within this peaks indicating particular vulnerability were noted at age four and fourteen, which in many studies is the upper age limit for statistical grouping. Males at 77% and females at 26% of the cohort show quite clearly that the male child is at greater risk. Seasonal distribution was also noted with spring at 26%, summer 43%, autumn 22% and winter 9% thus providing clear indication of when children participate in high risk behaviours.

1.5 HAZARDS

It is questionable whether the hazards to which people are exposed are understood by those responsible for opening the countryside to visitors, those working in the countryside or those visiting it. Cassstles (1998) aimed to consider the hazards in an open farm environment to which non-employed people could be exposed. Ten farms were included in her study: six city farms, two working farms and two commercial visitor attractions. The hazards were classified as physical, biological and chemical. Analysis showed that an underestimation of these hazards occurred, particularly in the area of biological hazard. The measures in place to control and prevent accidents were inadequate for biological circumstances and in some cases contributed to a worsening of the situation. This refers to gastro-intestinal illness contracted as a result of visits to farms, this subject is explored more fully under the heading of Zoonoses in a further section of this document.

The physical hazards were found to be well controlled although there were problems associated with vandalism and maintenance, especially in the city farm environment. Accidents associated with maintenance are mentioned by Schelp (1992) who reports that these accounted for half of the work place injuries seen in the municipality under scrutiny for this study, attributable partly to neglected safety work. Many of the serious accidents occurring on farms involve machinery, driving tractors and all-terrain vehicles – not something the visitors usually does. However those driving the vehicle may be responsible for injuring or killing a member of the public as they can neither see nor hear them and the victim has no idea of their vulnerability. Cassstles gives example of the years 1986-1996, referring to eighteen people run over and killed by vehicles on farms, fifteen of these were children.
Actual physical contact with livestock, a major attraction for the visitor could result in being kicked bitten or knocked over and trampled on. People must be aware of the nature of the beast, animals can be aggressive and extremely protective of their young. Access by people to animals should be safely controlled. Those walking dogs in open fields grazed by stock, particularly cattle, must be aware that aggression may well be triggered. Even over enthusiastic curiosity by the animal can result in a nasty incident with the possibility of being gored or crushed.

Byard and Gilbert et al (1998) made these points when they organised their study into farm and tractor related childhood fatalities in South Australia from which they hoped to obtain strategies for prevention of the same. They concluded that allowing children to ride unrestrained in tractor seats was the most dangerous activity and although such activity is illegal they felt that a suitable harness or restraint to prevent children falling out would greatly reduce the incidence. The law in Australia requires that persons can only ride in a tractor or similar if there is a designated seat and suitable restraint provided. Many modern tractors do have a passenger seat, but no harness and even if it is available it might not be used. In the UK, children are not allowed to ride in a tractor or drive one until they are thirteen years of age. To follow the Australian recommendation would necessitate a change in the law.

The farm environment has areas where water immersion is a major hazard. Drinking troughs and water butts are large enough to contain sufficient water for a child to drown in. The weight of saturated clothing and wellingtons which act like anchors when full of water make it very difficult for a small child to extricate itself from such a container. In addition to pulmonary embarrassment with water hypothermia contributes to the demise of the child. Many farms have ponds and streams which help animals to be re-hydrated and further, a fast flowing river presents not only the risk of drowning but also of being swept away from the location downstream which may make it harder to find the missing child quickly. Two studies mentioned drowning and concluded that more research into accidental immersion is required. Lindholm and Steensberg (2000) reported on unintentional drownings bought to hospital during 1995 in Denmark. The cases totalled 167 (adults 120 and children 47). The annual incidence is documented at 5.2/100,000 in children, adult males 4.3/100,000 and adult females 1.2/100,000. Clearly children are the largest at risk group and from the cohort studied eight died. Schelp (1992) mentioned drowning as a category, in the research from Sweden, from a population of 32,138, drownings both fatal and non-fatal, accounted for 2% of the causes of accident.

1.6 ATTITUDE, AGE AND BEHAVIOUR

The socialisation processes experienced by the visitor especially children will represent a major factor in the manner of their behaviour. Age and sex are thought to be important in safe behaviour. Many studies recognise that males are more at risk of accident than females until they reach sixty-five years and then the risk equals. There is also a significant risk for the ages 0-4 years and again an increased risk in teenage years. Home Accident Surveillance Systems (1987 data) shows the home as the highest risk area for accidents and that falls are a major cause category. Wolfendon and Lower et al (1992) found that males were over represented and that weekends and the afternoons were times for presentation at emergency departments with injuries of which arm injury was common in farm children. Falls were the most prevalent and mechanical involvement caused the most serious injury. This information correlates with the work of others researching this subject, cited elsewhere in this literature review. Any influences impairing judgement are important for the older child, an example could be the influence of alcohol one of a number of substances or drugs (Casstles 1998).

In America The National Committee for Childhood Agricultural Injury Prevention (NCCAIP) is charged with generating specific, targeted childhood agricultural injury prevention recommendations aimed at policy development and target setting. This organisation will celebrate fifteen years of active
initiatives in 2002 and is centred in Marshfield Wisconsin. Their recommendations emerge as a result of epidemiological studies of the current injury problem to children generally, and that affecting adults too. The project organisers have endeavoured to work with farmers and their families to effect behavioural change. The debate about the positive outcomes achieved in this way continues with Hanna (2001) believing that

“meaningful change cannot happen without the support and guidance from the intended audience.”

Opposition does exist to this view and Marlenga (2001) argues that

“Progress has been too slow and that 25 years of working in partnership has not brought quickly enough the results desired by so many.” She believes

“That in trying not to alienate or blame farming communities the project has become an accomplice in a tradition which allows children to be killed or maimed.”

Clearly the difficulties in grappling with the issues are as concerning to the public health forum in the USA as they are to the HSE in the UK although some of their strategies are innovative and proactive.

Rivara (1985) believes farm activity in the USA is ranked second to mining in terms of occupational danger with he estimates,

“300 fatal and 23,500 non fatal childhood incidences occurring each year.”

The above opinion, reinforced by CAISP in Canada and by Wolfendon and McKenzie et al (1992) in Australia who believe the dangers of farming as an occupation are only exceeded by mining and transport. As a worksite they note the farm as the only workplace where the presence of children is usual.

The work of NCCAIP is enmeshed in occupational, traffic and transport safety studies. Lee, Jenkins and Westaby (1997) considered the major hazard factors which research had showed to be important for children on family farms as part of the development of a prevention strategy. It emerged in Lee and Westaby (1997) that the largest factor related to the acceptable behaviour of children on the farm was the attitude of the farming father towards their young; the perceived role they could and should demonstrate in the enterprise. Controlling factors were revealed as the feminine members of the family, frequently the grandmother. It identified the female role as that of assessing the nature and suitability of the proposed activity.

Further explanation informs the reader that fathers believed that children should gain experience of the ‘enterprise’, that they should develop a strong work ethic and become confident in work. While accepting that the use of child labour is abhorrent, unethical and illegal in other areas of work they perceived that within a family enterprise attempts to save on the use of paid external labour by the use of children when family members was acceptable. The fact that these people are not employed frequently circumvents the application of employment law both in America and the UK.

Other studies reported that those children aged less than five, of either sex, were at risk (Purschwitz, 1990; Stallones and Gunderson, 1994), however the male child over five years is seen to be at greater risk of accident (Stallones and Gunderson, 1994). Children aged 15-19 years had an increased incidence of tractor and machinery related accidents (Sheldon and Field 1995), whereas for those less than fifteen years the contributing factor was more likely to be animal rather than machinery (Cogbill, Busch and Stiers 1985).
Frequently the factors, cited in the American research, that contribute to farm accidents affecting children are the lack of, or cost of, childcare (Wilks 1993 and Lee and Westerby 1997). As an example parents believe it is better to have the child on the tractor with the adult than to leave the child unattended elsewhere. Child care off the farm is regarded as unaffordable, unnecessary or unavailable.

Research conducted for Morecambe Bay Health Promotion in the UK by Exeter University (2000) asked questions, directly to children, about the nature of agricultural activities that they participated in. Linked with these questions were a number of issues considered to be connected to rurality. The study utilised one hundred and fifty eight children from two rural schools in Cumbria. The work to produce this document was conducted by Exeter University, Education Division who for the year 2000 reported on the equipment which young people may have been exposed to which would constitute unusual risk. They found that young people were involved in activities which may include the use of tractors, trailers, harvesters, balers, quad bikes, sheep dip, shot guns, air rifles, chainsaws and axes. Further, animal handling for such reasons as giving medication, dipping sheep, cleaning out, moving livestock, and lambling were cited by the authors. The use of machinery and animal contact combined for tasks such as mucking out and spreading the same, working around slurry pits and towers. Using welding equipment and fencing were other tasks on the list which young people acknowledged they took part in. Males predominated in the use of welders, machinery and jobs such as mucking out whereas females more commonly worked with animals and were generally less active than their male counterpart. Interestingly in this survey 96% of respondents, claimed to have received training provided by a family member for the task. Table two and three below are derived from the Exeter (2000) report which utilised two rural schools in Cumbria for the data and lays out some quite revealing information. It must be recognised that the children were only responding to the question asked. The study cannot inform the reader regarding any exaggeration in the degree of involvement they really had in the activities therefore some caution is indicated in fully accepting what the children say they do.
Table Two.

Percentage of pupils in each group responding to question C11: Have you ever been involved in any of these activities in the course of farm work?

<table>
<thead>
<tr>
<th>Activity</th>
<th>8 Year 8</th>
<th>10 Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 Male</td>
<td>1 Female</td>
</tr>
<tr>
<td>1.00a: Handling livestock</td>
<td>27%</td>
<td>30%</td>
</tr>
<tr>
<td>2.00b: Cleaning out livestock</td>
<td>25%</td>
<td>26%</td>
</tr>
<tr>
<td>3.00c: Giving medication to animals</td>
<td>13%</td>
<td>11%</td>
</tr>
<tr>
<td>4.00d: Helping with sheep dipping</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>5.00e: Lambing</td>
<td>27%</td>
<td>25%</td>
</tr>
<tr>
<td>6.00f: Muck spreading</td>
<td>15%</td>
<td>6%</td>
</tr>
<tr>
<td>7.00g: Working around slurry pits</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>8.00h: Using welding equipment</td>
<td>25%</td>
<td>11%</td>
</tr>
<tr>
<td>9.00i: Putting up fences</td>
<td>35%</td>
<td>23%</td>
</tr>
<tr>
<td>10.00j: Beating (grouse or pheasant)</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>11.00: None of the above or missing data</td>
<td>46%</td>
<td>55%</td>
</tr>
<tr>
<td><strong>1.00 Total Sample (Count)</strong></td>
<td><strong>67%</strong></td>
<td><strong>68%</strong></td>
</tr>
</tbody>
</table>
Table Three

Percentage of pupils in each group responding to C9: have you ever driven or used any of these?

<table>
<thead>
<tr>
<th>Task</th>
<th>8 Year 8</th>
<th>10 Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 Male</td>
<td>1 Female</td>
</tr>
<tr>
<td>1.00a: Tractor</td>
<td>39%</td>
<td>9%</td>
</tr>
<tr>
<td>2.00b: Tractor and Trailer</td>
<td>22%</td>
<td>2%</td>
</tr>
<tr>
<td>3.00c: Harvester/bailer/digger</td>
<td>18%</td>
<td>4%</td>
</tr>
<tr>
<td>4.00d: Quad bike (or similar)</td>
<td>73%</td>
<td>45%</td>
</tr>
<tr>
<td>5.00e: Sheep dip</td>
<td>8%</td>
<td>55%</td>
</tr>
<tr>
<td>6.00f: Shot gun</td>
<td>35%</td>
<td>9%</td>
</tr>
<tr>
<td>7.00g: Air Rifle</td>
<td>51%</td>
<td>15%</td>
</tr>
<tr>
<td>8.00h: Chainsaw</td>
<td>20%</td>
<td>11%</td>
</tr>
<tr>
<td>9.00i: Axe</td>
<td>78%</td>
<td>40%</td>
</tr>
<tr>
<td>10.00 None of the above</td>
<td>6%</td>
<td>35%</td>
</tr>
<tr>
<td>(or missing data)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00 Total Sample (count)</td>
<td>67</td>
<td>68</td>
</tr>
</tbody>
</table>

(Regis 2000, Schools Health and Education Unit, Exeter University).

CAPT (2000) provide some indication of the perception of danger attached to different tasks by the different people involved in either requesting they be done, sanctioning permission for them to be done or desired to be done by the children. This information given in table four is age apparent.

Table Four

Different perceptions of dangers for different groups.

<table>
<thead>
<tr>
<th>Task</th>
<th>Professional</th>
<th>Worker</th>
<th>Farming Parents</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age Range</td>
<td>Average Age</td>
<td>Age Range</td>
<td>Average age</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Feed pet lamb</td>
<td>5-10</td>
<td>7</td>
<td>2-16</td>
<td>7</td>
</tr>
<tr>
<td>Harvest mushrooms</td>
<td>6-18</td>
<td>11</td>
<td>3-15</td>
<td>11</td>
</tr>
<tr>
<td>Carry feed buckets</td>
<td>10-14</td>
<td>12</td>
<td>4-17</td>
<td>11</td>
</tr>
<tr>
<td>Help sort and load cattle</td>
<td>12-18</td>
<td>15</td>
<td>8-17</td>
<td>14</td>
</tr>
<tr>
<td>Spray and use farm chemicals</td>
<td>16-21</td>
<td>18</td>
<td>12-20</td>
<td>16</td>
</tr>
<tr>
<td>Drive an ATV or Quad</td>
<td>12-21</td>
<td>16</td>
<td>10-17</td>
<td>13</td>
</tr>
<tr>
<td>Drive/ride a tractor</td>
<td>16-21</td>
<td>16</td>
<td>10-19</td>
<td>15</td>
</tr>
</tbody>
</table>

(M=Mother, F=Father, G=Girls, B=Boys, Professional Workers=health visitors, nurses, teachers)

(Child Accident Prevention Trust, 2000, P3).
From this chart it can be seen that parents believe a task to be suitable for children at a much younger age than the view of suitability taken by professionals. Children actually perform these tasks at a younger age than recommended by professionals in some cases although the average age is likely to be nearer to the one recommended by the professionals. This is allied to the comments regarding maturity for the task made by CAPIC (1992) and to the work in the USA on age appropriate tasks by the National Children’s Centre for Rural and Agricultural Health and Safety (NAGCAT, 2000).

1.7 CONTRIBUTORY FACTORS

Farms are different as places of work, they usually combine an industrial and a habitation environment. Mercer (1998 p 1) in her report for Northern Ireland noted,

“The farm is the only work site where the presence of children is usual.”

The CAISP data collection in Canada endorsed in Sweden by Schelp (1992) has made a detailed attempt to capture information about farming accidents and identifies contributory factors.

- Fatigue
- Breakdowns
- The pressure of weather and time, the harvest period identified particularly.
- Little distinction between home and work environments.
- Large machinery.
- Large, unpredictable animals.
- Financial imperative. With depressed market indicators adding to the risk.

1.8 SAFETY EQUIPMENT

The issues surrounding the provision and use of safety equipment is raised by a number of papers notably in connection with equestrian events and the use of all terrain vehicles, where in both cases, protection of the head by the wearing of suitable well fitting helmets which protect the head and face are essential. Ward and Klassen (1998) note that ATV’s are used by urban children for ‘fun rides’ and by farming children for both work and fun. Their findings, revealed after interviewing children aged 11-14 years who had been admitted to emergency room for treatment, suggest that up to 40% of 162 incidents had not been wearing protective head gear and that within the farming sector a greater amount of undesirable behaviour or ‘fooling around’ was likely. This is possible due to availability and familiarity with the equipment.

Sori (2000) studied the demography of hospital admissions and mortality associated with equestrian activities among 33,000 riders in British Columbia. They found that head injuries were significant with female teenagers and female children having a higher consultation rate in emergency departments than that given for the general population. Three deaths were reported in this paper, translated to 1 in 10,000 riders. Again this relates to approved head protection, properly worn and also correct riding boots.

The respected study by Coghill and Bush et al (1985) frequently referred to by other authors is considered valuable to current research when trying to comprehend the nature of accidents. The knowledge gained led to increased understanding about the benefits of specialised protective clothing, education for parents and carers re the risks involved with farming activities and new initiatives to provide compulsory training for those over fourteen who are hired as farm labour, however compulsion cannot apply in the USA to children working as family members, who therefore remained outside legislation and a vulnerable group. Since this time guidelines to be used by parents have been prepared in North America ( NAGCAT 2000) to help assess the suitability of agricultural tasks for children.
CHAPTER 2

MAGNITUDE

In the USA there have been major initiatives to understand the magnitude of the injury problem as it affects children. The National Safety Council accepts the fact that children make up a large portion of the agricultural work force (Accident Facts 1996). Rivara (1997) believes that, advances in the medical care of accident victims, resulted in a decline in mortality but a subsequent increase in morbidity. It is recognised that children on farms are a vulnerable group and that ongoing injury surveillance must be employed to reduce victim numbers in this group. The point is made that children are constantly exposed to risk if they live on a farm regardless of whether they are considered to be working.

“This is qualitatively different from other industries in which children would have little, if any exposure to occupational hazards”.

“The high number of injuries in the pre school age group combined with the severe nature of those injuries is of great concern. These children are injured as innocent bystanders because the place where they live is also a place of dangerous work.”

(Rivara 1997, p190)

The paper by Rivara separates the injuries in the 10 – 14 years age group, where in this case it is believed that lack of experience and risk taking behaviours are the attributing factors. Several authors endorse the view that child development is a possible co-factor as small physical size in relation to the equipment involved represents a hazard. Further, mental faculty and capacity as understood in child developmental structures are implicated in safe behaviours as Piaget made known as early as 1929.

The data used for Rivara’s study is from the National Electronic Injury Surveillance System (NEISS). Statistically the fatality data is regarded as accurate however NEISS makes the proviso to the reader that the data published and used for morbidity cannot with confidence be regarded as accurate. The sample used for morbidity and quoted in the table 5 below was based on figures compiled from accident and emergency departments as reported by NEISS. It is viewed as incomplete especially when considering incidences which have occurred in rural areas, further it is noted that there is little data regarding injuries treated in physicians offices which holds particular relevance to this work.

Rivara has used historical data for the claims made and discussed both morbidity and mortality information. During the period 1900-93 he provides figures for non-fatal injury as 1717 per 100,000 and believes this to be an increase on previous years. Table five provides an indication of age and sex separation in the numbers involved.
Table Five
Non fatal Injury /100,000  (Rivara 1997, p191)

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>1214</td>
<td>660</td>
<td>953</td>
</tr>
<tr>
<td>5 - 9</td>
<td>1884</td>
<td>1107</td>
<td>1518</td>
</tr>
<tr>
<td>10 - 14</td>
<td>2923</td>
<td>1239</td>
<td>2135</td>
</tr>
<tr>
<td>15 - 19</td>
<td>3399</td>
<td>944</td>
<td>2279</td>
</tr>
<tr>
<td>All Ages</td>
<td>2360</td>
<td>983</td>
<td>1717</td>
</tr>
</tbody>
</table>

This presents the finding that males have a 2.4 fold greater rate of accident than females on average but in adolescent years that difference increased to 3.6. Children older than ten years posed a significantly greater risk than those younger. Table six provides an indication of the type of injury sustained and table seven and eight provides information of the parts of the body affected. Table nine lists the activity or machinery involved in these accidents. These figures compare well with a study in Wisconsin by Strueland et al (1996) who estimated the rate of farm injuries to children at 1827 per 100,000.

Pickett et al (1995) in Canada estimates that 68% of injuries require medical care but that only 28% receive that care in accident departments. Again Pickett found, using similar data methods, 2000 per 100,000 injuries resulting from farms in Ontario, Canada.

Table Six
National estimate of annual farm injuries, in the USA 1990 – 93, 0-19 years, rates per 100,000 resident farm children (%).

<table>
<thead>
<tr>
<th>Type</th>
<th>&lt;5</th>
<th>5 - 9</th>
<th>10 - 14</th>
<th>15 - 19</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laceration / punctures</td>
<td>378 (40.4)</td>
<td>574 (36.9)</td>
<td>801 (37.6)</td>
<td>829 (36.4)</td>
<td>644 (37.6)</td>
</tr>
<tr>
<td>Dislocations / fractures</td>
<td>118 (12.6)</td>
<td>282 (18.6)</td>
<td>449 (21.1)</td>
<td>291 912.8)</td>
<td>244 (19.5)</td>
</tr>
<tr>
<td>Contusions / abrasions / haematomas</td>
<td>182 (19.4)</td>
<td>351 (23.2)</td>
<td>474 (22.2)</td>
<td>589 (25.9)</td>
<td>398 (23.3)</td>
</tr>
<tr>
<td>Crush</td>
<td>17 (1.8)</td>
<td>27 (1.8)</td>
<td>24 (1.1)</td>
<td>33 91.5)</td>
<td>25 (1.5)</td>
</tr>
<tr>
<td>Strains and sprains</td>
<td>3 (0.3)</td>
<td>65 (4.3)</td>
<td>161 (7.6)</td>
<td>227 )10.0)</td>
<td>114 (6.7)</td>
</tr>
<tr>
<td>Avulsions / amputations</td>
<td>11 (1.2)</td>
<td>45 (3.0)</td>
<td>27 (1.2)</td>
<td>76 (5.0)</td>
<td>49 (2.9)</td>
</tr>
<tr>
<td>Burns</td>
<td>51 (5.5)</td>
<td>45 (3.0)</td>
<td>43 (1.4)</td>
<td>59 (2.6)</td>
<td>39 (3.0)</td>
</tr>
<tr>
<td>Concussions</td>
<td>8 (0.9)</td>
<td>8 (0.5)</td>
<td>37 (1.8)</td>
<td>9 (0.4)</td>
<td>15 (0.9)</td>
</tr>
<tr>
<td>Other</td>
<td>185 (19.4)</td>
<td>121 (8.0)</td>
<td>119 (5.6)</td>
<td>166 (7.3)</td>
<td>150 (8.7)</td>
</tr>
</tbody>
</table>

(Rivara 1997, p192)
Table Seven

National estimates of annual farm injuries, by body part, and age group in the USA, 1990 -93 (%).

<table>
<thead>
<tr>
<th>Body Part</th>
<th>&lt;5</th>
<th>5 - 9</th>
<th>10 - 14</th>
<th>15 - 19</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>17%</td>
<td>12%</td>
<td>5%</td>
<td>6%</td>
<td>8.7</td>
</tr>
<tr>
<td>Neck</td>
<td>0</td>
<td>1.8</td>
<td>0.9</td>
<td>1.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Face</td>
<td>29.4</td>
<td>15.7</td>
<td>15.0</td>
<td>5.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Trunk</td>
<td>5.7</td>
<td>7.8</td>
<td>7.9</td>
<td>5.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Upper Extremity</td>
<td>28.7</td>
<td>28.8</td>
<td>29.1</td>
<td>36.3</td>
<td>31.4</td>
</tr>
<tr>
<td>Lower Extremity</td>
<td>9.3</td>
<td>28.2</td>
<td>39.4</td>
<td>33.9</td>
<td>30.8</td>
</tr>
<tr>
<td>Other</td>
<td>9.5</td>
<td>5.7</td>
<td>2.5</td>
<td>3.5</td>
<td>4.5</td>
</tr>
</tbody>
</table>

(Rivara 1997, p191)

The Canadian data (CAISP) identified arm and upper limb injury as the most common associated with machinery. Open wounds, arm fracture and traumatic digit amputations numbered at 49.2% (n62 of 126 cases) resulting from entanglements with moving parts, accounted for the greater number of consultations in the emergency room. Schelp (1990) suggests in table eight that one third of injuries affect the arm and hand according to the cohort he examined. Vanneuville and Corger (1992) found in France that seven of the fifteen victims examined had severe upper limb fractures, amputations and avulsions. Two had head injuries and the remaining six had multiple injury including upper body, lower body and multiple organ damage.

Table Eight

Predominance of Hand and Arm Injuries

<table>
<thead>
<tr>
<th>Head</th>
<th>Arm</th>
<th>Hand</th>
<th>Lower limb</th>
</tr>
</thead>
<tbody>
<tr>
<td>29%</td>
<td>12%</td>
<td>24%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Schelp (1992)

The causes in this table are defined as blows, hits, collisions and crashes.
Table Nine

Percentage of farm injuries by cause, in each age group, in the USA 1990 – 93 (%).

<table>
<thead>
<tr>
<th>Product</th>
<th>&lt;5</th>
<th>5 - 9</th>
<th>10 - 14</th>
<th>15 - 19</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor</td>
<td>33.4</td>
<td>20.8</td>
<td>15.9</td>
<td>20.2</td>
<td>20.9</td>
</tr>
<tr>
<td>Tillage Equipment</td>
<td>9.1</td>
<td>5.9</td>
<td>3.2</td>
<td>7.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Combines / threshers / hay processors</td>
<td>2.6</td>
<td>6.6</td>
<td>2.5</td>
<td>6.3</td>
<td>4.7</td>
</tr>
<tr>
<td>Elevators / conveyers</td>
<td>2.3</td>
<td>0.6</td>
<td>0.9</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Farm wagons</td>
<td>5.4</td>
<td>10.9</td>
<td>8.8</td>
<td>5.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Forklifts</td>
<td>3.3</td>
<td>2.9</td>
<td>2.4</td>
<td>1.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>9.6</td>
<td>2.7</td>
<td>0.5</td>
<td>0.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Silo Loaders</td>
<td>1.3</td>
<td>2.6</td>
<td>1.8</td>
<td>1.4</td>
<td>1.7</td>
</tr>
<tr>
<td>Horseback riding</td>
<td>3.2</td>
<td>9.4</td>
<td>10.7</td>
<td>7.9</td>
<td>8.4</td>
</tr>
<tr>
<td>ATV / trail bikes / mini bikes</td>
<td>0.9</td>
<td>5.9</td>
<td>12.0</td>
<td>8.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Other</td>
<td>28.9</td>
<td>31.8</td>
<td>41.3</td>
<td>38.8</td>
<td>36.6</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(Rivara 1997, p192)

2.1 NOTIFICATION IN THE UK

Cameron and Bishop et al (1992) published findings from a study of one years duration, conducted in Dyfed, a county in Wales, where they examined non-fatal farm accidents to children from March 1990 – February 1991. The data collected for this study was based on those under sixteen who attended accident and emergency departments and were connected to agriculture. At the time of the study Dyfed had a population of 352,600, of whom 12,000 where directly employed in agriculture and about 3,500 children under sixteen lived on farms in the area. During the study 65 non-fatal accidents were reported. Forty-seven of these children lived on the farms concerned, eight of the accidents happened to children who worked on the farms and eighteen to those children visiting the farms. It is noteworthy that “none of these accidents in Dyfed were reported to RIDDOR” (Cameron and Bishop et al 1992, p24). The majority of the accidents occurred in the farmyard which is similar to the findings of CAISP who identify that fields and corrals as the area where accidents occur.

Walsh (2000) reported on the findings resulting from a study in Cumbria designed to be able to make comparisons with a former study by Evans (1999). From a cohort of ninety patients reporting farm accidents to general practitioners they had a group of 14.4% (n14) children less than nineteen years. This compared with Evans who had 10.8% of patients in this age group. Farm accidents in Britain, both fatal and serious should be reported to the HSE via RIDDOR for investigation and quantification. The role of this body as policemen of dangerous practice makes their duel role as
educators and preventers of accidents untenable (Walsh 2000). The authors make the point that there is considerable under reporting of these incidents in England and Wales due to fear of recrimination by those in authority.

“either the farmers are not aware of the scheme or are afraid of prosecution by the HSE.”

Burnett (1991) made observations regarding the reporting of accidents. He noted that to qualify as serious the victim must take time off work for three days or more. This cannot apply to children and also it is unlikely, he felt, to apply to many farmers who in the capacity of self employed need to get back to work quickly. To highlight this he made the observation to be seen in table ten, taken from an HSE (Riddor) injury statistics report.

**Table Ten**

Average annual incidence rates of injuries per 100,000 employees 1986 –1990 (UK)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Fatal</th>
<th>Over 3 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>2</td>
<td>1091.7</td>
</tr>
<tr>
<td>Agriculture</td>
<td>7.6</td>
<td>447.8</td>
</tr>
</tbody>
</table>

(Burnett 1981-91, p17)

**2.2 CAUSE AND TYPE OF INJURY IN THE UK**

Table eleven shows the numbers of children affected by cause and comparison is made in the table with the only other data available, which is for fatal accidents (Cameron and Bishop et al 1992).

**Table Eleven**

Causes of UK farm accidents in children – number affected.

<table>
<thead>
<tr>
<th></th>
<th>Dyfed 1990-01</th>
<th>National Fatal Accidents 1986-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self propelled machine</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Other field machine</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Chainsaw</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Falls</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>Falling Objects</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Livestock related</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Poisoning</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Drowning</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Asphyxia</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fire</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>65</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

(Cameron and Bishop 1992, p24)

Table twelve demonstrates the causes of accidents where the victims were admitted to hospital, again
allowing comparisons with the finding of other studies citing the most common causes of accidents affecting children, connected with farming enterprises.

Table Twelve

Details of farm accidents occurring to children, resulting in admission to hospital.

<table>
<thead>
<tr>
<th>Case No</th>
<th>Age</th>
<th>Type of Accident</th>
<th>Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>Fell off Bales</td>
<td>Fractured radius and ulna</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>Farm bike fall</td>
<td>Fractured humerus and L3 vertebra</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>Fell in yard</td>
<td>Fractured nose and head injury</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>Tractor ran over neck</td>
<td>Head injury</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Fell in inspection pit</td>
<td>Head injury</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>Fell off bales</td>
<td>Fractured skull</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>Fell in yard</td>
<td>Head injury</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>Fell off pallets</td>
<td>Fractured nose and head</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>Fell off bales</td>
<td>Fractured skull</td>
</tr>
</tbody>
</table>

(Cameron and Bishop 1992, p24)

The findings in this study, as with others such as the CAISP data, show that falls constitute a major factor in farm accidents. Those from one level to another and those involving tripping, slipping or stumbling account for many head, leg and arm injuries. Also quad bike / tractor type accidents are a major category. As in the reports from the USA comment is made about the exciting nature of farm work for children both to be involved with and to watch. The accident area is familiar as frequently it is the home. If it is a holiday venue the added adventure factor is important. Walsh (2000) found that the majority of the accidents investigated by the research in Cumbria occurred in the farmyard or farm buildings, areas that workers were well acquainted with and also those areas used intensively. Conclusions reached suggested that familiarity and intensive use of an area contributed to risk. The farm yard is also a location where children are likely to be and where they can associate with the older members of their family or other farm staff.

A general practitioner in the UK decided to note more carefully the types and causes of farming injuries to his patients over a ten year period (Burnett 1981-1991). He recorded 150 accidents from a possible 280 farm holdings, six of which were to children. Discussing children he makes the point expressed by Lee and Jenkins et al, that it is easier to have the child in the tractor than invisible playing in the yard. Three of the children had yard-based injuries in his study. One child was crushed by a falling gate. Two others were tractor related, in one case a three year old fell from a tractor and was run over. Another child, aged four, fell from a draw bar and was run over. All the children in these cases suffered non-fatal injuries (Burnett 1981-1991). The identification of strategies for the avoidance of accidents in children from an Australian study suggest a particular consciousness regarding electrical tools, chemical, and bullets but a different attitude towards tractors, especially the removal of keys, the wearing a safety hats for horse riding and quad bike riding, activities appearing to take place by children unsupervised. Security of the axe, access to hay barns, worming the dog and the wearing of ear protection in noisy environments were all areas needing greater vigilance (Wolfendon and McKenzie et al 1992). Noise injury to sensitive hearing mechanisms is not well documented as a farming injury but nevertheless is important.

Different reporting methods in Ireland are thought to favour a less punitive approach to Health and Safety legislation following the reporting of incidents, the collected evidence by Mercer (1998)
reflects a greater willingness on the part of those affected to contribute to data collection.

2.3 TRENDS AND DEMOGRAPHY

The study by Walsh (2000) notes with alarm that in the period 1930-1980 deaths connected with agriculture have increased by 44% whereas deaths from non-farm related machinery accidents have decreased in this period by 75%. This information appears to suggest that in general industry accident prevention is working whereas in farming industries it is not. Another factor related to this statistic is the remote nature of some farming accidents and the difficulties in an injured person being reached and effectively treated by the emergency services. In the industrial sector it may be easier to reach the person more speedily and trained personnel may be available quickly to assist. This latter point, was also documented by Rivara (1997) when he noted a trend for reduced mortality and increased morbidity.

The demographic aspects of agricultural activities is explored by Vanneauville and Corger et al (1992), and the cited figures from the French Ministry of Agriculture, released in 1989, are used to support their view. At this time 57% of French territory was reserved for agriculture, managed by 5% of the population. The rural population has declined by 3.45% per year for the previous twenty years. The land under management has remained the same in size and the farms have increased in size. Employee numbers are continually decreasing and enterprises are managed and run by the family with seasonal aid. Mechanization has increased to improve output. Children perform duties beyond their strength and understanding. Infants and the very young are left unsupervised in dangerous environments. The authors noted the peak time in the year for accidents was summer and autumn a time accounting for eleven of the fifteen accidents examined for the study. Only the remaining four accidents occurred in the winter. Children who live on farms give help willingly. Those who visit farms, the author believes find …

“the environment is magical, a fancy, embellished by their toys, books and TV soaps, a common characteristic of which is to deny any potential hazards.”

He attributes accidents in part to exhaustion especially in summer and a failure to properly maintain potentially dangerous equipment, not because there is a desire to add to danger but because there is just too much work for the labour available.

Further finding were the sex ratio differences in accident victims, as males constituted ten and females five of the fifteen studied (Vannuville and Corger et al 1992), a fact the author compared with the work of others such as Rivara (1985), Cogbill (1985) and Swanson (1987), and which is supported by other researchers in this review.

2.4 RESPONSIBILITY AND SAFETY

Farms which open to the public have mainly recognised their responsibility as a commercial enterprise, to offer safe facilities for their visitors (Cassles 1998). This effort is undermined in some city farms by vandalism with one significant risk being that of fire resulting from arson.

Visitor farms pose less risk in the area of machinery related accidents as visitors are not normally allowed to operate such equipment. Animals, another major risk zone, do come into contact with visitors, sometimes too closely causing accidents and disease spread. This latter point is discussed in the section on zoonoses. Ten incidents of trauma due to livestock were noted in the Cassles (1998) study.

Adventure holidays including pony trekking for children are a different aspect of animal contact for
members of the public. One provider of such holidays found when they analysed their accident figures that the cause of the greatest number was trekking and in some cases the unexplained behaviour of quiet and normally well mannered horses who seemed to ‘stampede’ in the paddock in an unexpected manner on occasions when the young riders were entering the paddock in the morning to prepare for the days riding. This company is endeavouring to understand this situation and take the appropriate actions to avoid accidents and to lower the number recorded.

Lower and Wolfendon (1995) focused a study on horse related injury in Australia choosing four rural areas for their study. A major concern, which they document, is that rural injury has a higher mortality than urban injury (Glover and Woollacott et al 1992, Lewis and Lyle et al 1991, Mason 1991, Vimpani et al 1988). They found that up to one third of injuries to farm children resulting in time away from school are horse related and feature a high percentage of falls. There is a concentration of cases in the female adolescent. Most horse riding takes place on private property where it is difficult to enforce existing legislation particularly regarding protective or appropriate clothing including approved hats, a factor cited by Sorli (2000). Accidents and injury seem to be connected to the degree of experience (Lower and Wolfendon 1993), adult supervision and parental awareness of the dangers represented by horses. They found that only 57% of riders always wore an approved hat and two thirds of this cohort had riding boots. The bulk of riders were taught in a haphazard manner by parents or friends, and only one third were supervised by an adult when riding. Incredibly less than 20% of the children considered that horses were potentially dangerous. As a result of this study a positive change occurred following an education approach taken to all schools in the area and invitations to include parent and carers in the information sessions. Equine organisations are enthusiastic about the programme and valued the initiative to raise awareness of horse safety.

2.5 ONE THIRD WORLD PERSPECTIVE

A rather different study undertaken in India (Singh and Kaur 1996) examined and compared minor injuries in a group of urban and rural school children. The authors noted the scarcity of information on non-fatal childhood injury and chose to focus on wound management. The cohort selected numbered 110 from rural areas and 112 from urban areas. They found that the majority of incidents occurred in the field or playground. Numbers identified as 182 rural and 147 urban accidents occurred out of school hours, which suggested that to an extent the rural children were working when the injury took place. The most common site of injury was the hands, fingers and feet with causes listed as foreign body such as thorn, blades, farm implements, sticks and falls. This compares well with information from more informed study areas. The study also showed that rural children were more resilient, seeking help and complaining less frequently. Unusual therapies were sometimes employed, especially by rural children and their carers. Urine, turmeric and mustard potion or chewed grass to an open wound being employed. Both the urban and rural injured received kerosene to the wound but more frequently the urban group. Interestingly the rural rate of healing was best (n245) with most wounds healed in less than seven days compared with the urban figure (n103). Tetanus protection was under utilised in the rural group. The authors call for a better appraisal of non-fatal injury causes in children and a better understanding of wound care and healing.
CHAPTER THREE

RECOMMENDATIONS

“Although injury results in the loss of more economically productive years of life than do cardiovascular disease and cancer combined, the support for research on injury control is relatively small.”


It can be derived from this comment that insufficient consideration is being given to researching the causative factors for farm injury compared with that given to industrial workplace injuries in general. Strueland and Lee et al (1996, p192) say …

“Prevalence is important but understanding the aetiology is more important for developing preventative strategies”.

3.1 THE ISSUES

Reed and Claunch (2000) attempted a systematic review of non-fatal injury incidence in the USA, affecting children, and were thwarted by the lack of valid and consistent denominators which impeded the obtaining and comparing of incident information. They urge strongly the need to standardise the measurements taken in research, particularly the short-term and long-term consequences of events. Children and others are surviving serious and debilitating accidents today whereas ten years ago those incidents would have been fatal. This has ramifications for the quality of life after accidents, something not being assessed sufficiently by research. Incomplete data represented in medical records was also cited as hampering the collection of evidence regarding disability following trauma. Wolfendon and Lower et al (1992) in Australia note that understanding the specific features and patterns of rural injury and the differences from urban counterparts is a prerequisite to preventive action in rural areas. In pursuit of this Wolfendon and McKenzie et al (1992) developed a checklist document to research the opinions of the various groups and ages involved, for the purpose of identifying causative factors with the potential for injury or worse. The outdoor nature of the job makes the workplace different. The weather is obviously a factor often resulting in pressure to complete a task. Isolation and lone working and heavy seasonal demand increase the working pressures. This special environment is noted in a Swedish study (Schelp 1992). Kemp and Dennis (2001) state that accidents in general are two – three times higher among disadvantaged groups and that in Wales 30% of children live in poverty. The nature of modern farming is creating considerable financial duress and poverty should be considered as one of the contributing issues.

Wolfendon, McKenzie and Sanson-Fischer (1992) are quoted as saying

“The farm has been argued to pose considerable dangers to children characterised as it is by the presence of physical hazards (machinery and animals). Involvement of children in farm activities, little coverage by safety legislation and even less enforcement (worksite inspection), and little if any way of formal training.”

(Mercer 1998, p 7)

The National Safety Council in the USA lists agriculture as the second most dangerous occupation after mining. Manufacturing industry, it notes, has a death rate one tenth that of agriculture. Factors highlighted are toddler inquisitiveness, the belief children hold that they are immortal and inexperienced combined with being assigned tasks beyond their years, today made more difficult by
innovative complex mechanisation. The excuse made by farmers, for the acceptability for using children as farm workers, is their wish to pass on their love of the land to those who will inherit it plus economical necessity. Shutské (1994) argues that to protect children from their own arrogance it is important to direct education into preventing children performing tasks rather than into attempting to teach them a safe way of performing the task. Further as children continually break rules as part of the barrier breakdown in growing up they should be encouraged to make their own rules to regulate their own behaviour.

3.2 RESTRAINT

The study by Lee, Jenkins and Westerby (1997) concluded that future educational development should collude with those already offering some behavioural restraint, i.e. grandmothers and mothers. Thus an increased awareness about the hazards could be engendered and this group could be used as a suitable medium to identify the suitability of the task and to utilise a method of assessing risk. There should be a determination of the nature of the farming tasks, and the age-appropriateness associated with them, for the minimisation of risk. This is something that has been pursued in The Marshfield Project in Wisconsin described at a later stage in this project. The checklist developed by Wolfendon and McKenzie (1992) is similar in that it helps to identify hazards. The authors cited also recommend a fresh look at the child labour law in the USA, and there are obvious implications for this in other countries. Bujak (1999) urges that the protection of children is vital and that parent and families must exercise common sense and caution when engaging children to work on farms.

3.3 CHILD DEVELOPMENT

The comprehensive study by Mercer (1998) reached very similar conclusions regarding recommendations. In particular she noted the lack of knowledge, amongst parents, regarding the developmental stages reached by children. Steele (1994) recognised the need for understanding of child development and the ability to anticipate forthcoming stages so that measures could be instigated before the child moves to a place of danger. Dual pronged approaches in thinking about child development are important both to understand and anticipate for prevention, and then to judge capability to manage a given situation. Physical size does not reflect cognitive ability. Shutské (1994) urges reflection on the work of Piaget (1929) and other child development theorists so that an appreciation of the actual capabilities of the child may be fully understood. The stage of formal operations referred to by Piaget is a point where abstract thinking and reasoning allow for evaluation and adaptation in the behaviour of the individual. The use of a farm safe checklist to help farmers undertake a risk assessment of their premises specifically related to the needs of children is advocated. The tool should be designed for the use of the different groups, e.g. farmer, child, mother. There is a good example and recommendation for this tool in the work of Wolfendon and McKenzie (1992). Strict exclusion policies, applied on some farms, may not be effective as the accident is often the result of the unforeseen. Many working practices are founded in out of date working styles. Regular review of how things are done in the light of modern developments may allow for the manipulation of some methods of work or even the elimination of some identified hazardous practices to avoid accidents (Stueland and Lee et al 1996). Rather than relying on banning children from the location, increasing their knowledge may be more effective in reducing accidents.

3.4 FUTURE RESEARCH AND DEVELOPMENT

The example provided in the paper by Rivara (1997) citing the National Committee for Childhood Agricultural Injury Prevention (NCCAIP) has produced thirteen recommendations to prevent these injuries and it forms part of a national plan. Among these is a requirement for an international database and surveillance system to track and record accidents and show understanding of the post-event phase. Such procedures would facilitate the production of guidelines for children and
adolescents who work in agriculture, indicating uniform standards of protection for young people, with appropriate enforcement of regulations. Positive requirements are for effective education of all concerned from the children to the parents and other operators to keep young people safe. This must be fully supported by the public and private sectors.

“A unique characteristic of the farm work site is the role of parents as educators, mentors and supervisors. As farm managers, parents control or cause to be created elements of both the physical and socio-cultural farm environment. So little is presently known of parental perspectives, level of knowledge relative to child development, levels of parental risk taking behaviour, and farm parent perceptions about the locus of control over health matters that new research initiatives relative to these socio-cultural variables and event phases appear imperative.”

(Stallones and Gunderson 1994, p16)

To support these objectives the Maternal and Child Heath Bureau has a major focus of activity in this area. Farm Safety 4 Just Kids, formed in October 1987 in the USA, is a grass-root organisation again focusing on the needs of children. Punitive measures do have a place in prevention strategies however legislation is only useful if it is known about and made to operate. Education using all means possible to reach the target audience of parents and children is vital. Experiential learning methods transferable to real settings are advocated by Shutske (1994). The learning must be organised from clear objectives, consistent, sustained and credible to the whole agricultural community so as to avoid differences in legislation and codes of behaviour in different parts of the world. The use of audio-visual equipment and the media offers good opportunities for education to enter the home and schools. The recommendations by Cameron and Bishop et al (1992) also fully endorse these last two points. Barrier methods of separating the risks from those vulnerable are the most obvious methods and the use of doors, locks and protective equipment must be encouraged.

If farms are to be opened to the public for leisure and educational visits then proper risk assessments by those trained to identify potential hazards must be carried out. Casstles (1998) found that the level of perceived risk was closely allied to the amount of specialised training the managers had received. She also noted the term “reasonable and practicable” which is included in the Health and Safety at Work Act (HSWA) 1974, and felt this encouraged an ethos of flexibility in interpretation of the rule allowing different standards to be tolerated in different organisations. Burnett (1991) noted that the fine for not reporting an incident to RIDDOR was £183 compared to the likely fine of £283 for a breach of the regulations in the HSWA 1974. An incentive he felt for farmers to keep quiet. Most of the farmers in Casstles sample seemed unaware of the responsibility to make a risk assessment and had not employed the professionals who could help them such as health and safety enforcement officers, veterinary surgeons and farming union officials. Members of the public are not acquainted with the dangers involved with entering a farm for leisure purposes. Organisations who do open their doors to the public frequently existed for profit yet resorted to help being provided by volunteers on an ad hoc basis, resulting in inconsistent staffing and supervision. Casstles felt there was much to be improved upon using effective risk assessments with concurrent implementation of the measures indicated.

3.5 POST INCIDENT ACTION

Many studies have suggested that over the post-war years injuries have increased and deaths have decreased. A reason put forward for this altered pattern is that treatment options have greatly improved during these years. Vanneuville and Corger (1992) believe the medically assisted transport unit (SAMU Unit) used to provide intensive management in the cases they examined saved lives and reduced severe sequelae. Lives have been saved and Mercer (1998) makes this point as one of the important strategies for the welfare of children on farms. She firmly believes that first aid training
for adults and even children is essential for farming families. Wolfendon and McKenzie (1992) found that 60% of farms had a complete lack of or incomplete first aid training and depleted or missing first aid equipment. Knowledge of emergency phone numbers is vital, as is an adequate description of the locality of the accident. A map reference, grid number or holding number is essential for the emergency services to find the victim quickly. This measure was developed by Powys Farm Accident Reduction Partnership (2001), for a section of the farming businesses in Wales. On the majority of farms this is not readily available. The isolated situation in which many accidents occur will mean that those first at the scene may be the ones to make a difference to survival outcomes. Mercer’s comments in this regard are reinforced by Evans (1992) when the work of the rural GP is examined in relation to accidents. In addition to careful treatment at the scene there is also a place for the involvement of the GP in education for prevention of such accidents.

3.6 CHILD CARE ISSUES

American, French and UK based studies advocate adequate, affordable and acceptable child care for working farmers and their families, especially in school holidays and after school hours, something that would greatly assist parents and keep the child away from the hazards. HSE documented collected statistics for 1999-2000 indicating that the predominant days for accidents to children during the data collection year was Saturday, Sunday and Monday. July, August and September were the months with the highest figures. This would appear to correlate with weekends, school holidays and possibly Bank Holidays. One farm in the UK which employed a large amount of casual labour during peak harvesting activity decided that rather then risk the loss of valuable workers by banning children from the farm it would be more constructive to organise a crèche for workers children for which only a nominal charge would be made. This facility complies with the Children Act 1991 and social services provided guidance for the construction and the management of the enterprise. This innovation, cited by the National Farmers Union (NFU) as an example of a supporting safety initiative, and the NFU have produced a leaflet called Child Care On Farms and Holdings. Farmers themselves must be made more aware of the risks their children are exposed to. Historically safety has taken second place to getting the job done quickly and as economically as possible (Doyle and Conroy 1989). Hawkins and Donham (1994) suggest child-care off the farm is the only fully protective measure. Their research has shown that women who work full time off the farm are more likely to make formal child care arrangements. Women who work on the farm or have no reason to be off the farm for employment are more likely to let their children, predominantly the under 5 years child, play in the work environment with supervision conducted by the worker or person operating the machinery. This attitude prevailed in 44.5% of mothers. A further 39% of mothers felt that children aged 5-13years could be left unsupervised in the house while they participated in farming tasks. In fact this age group, regardless of this perception, were less involved in accidents as they did not accompany parents in dangerous pursuits. The level of parental concern was questioned and it transpired that regardless of positive motivations the need, driven either by economics or labour shortages, overrode their concern for the welfare of the child. Parents acknowledge allowing children to help because “they needed it.”

3.7 THE THREE PRONGED APPROACH

Injury prevention strategies based on the model by Haddon 1980, Sleet et al 1991 and the World Health Organisation (WHO), (cited in Wolfendon and Lower et al 1992) highlight the three pronged approach: legislation, engineering and education as discussed below. Vanneuville and Corger (1992) endorse these approaches. Wolfendon and Clarke et al (1991) believed methods of health promotion combined with local community ownership and involvement provide an exciting approach as shown in a reported study conducted in New South Wales, Australia. The important aspects emerging from this study were
The study concluded that primary emphasis on education and behavioural change was essential but did not disregard a review of legislation both punitive and preventative.

3.7.1 Legislation

Legislation where it is employed must be effective and enforced but it should not be regarded as the most effective method of producing changes in behaviours. In the UK legislation entitled ‘Prevention of Accidents to Children in Agriculture 1998’, hoped to reaffirm the Governments intention to send a clear message that the law would be employed in the interest of safety. In America, Wilks (1993) is adamant that legislation must be reformed to adequately meet the need to protect and must be vigorously enforced. Our attention is drawn by the author to the fact that in America children even as young as twelve can legally work on farms, especially if the farm is owned by their parent. Itinerant children and their families often live in the field where they work, thus being exposed to pesticide residue and spray. Lack of adequate facilities means they cannot easily wash, and thus the risk of contracting zoonotic illness exists.

Government sponsored work is carried out in the UK: a particular focus in Lancashire during 1999 included visits to farms outside school hours, at weekends and in the holidays, not just to trap the unwary but to speak with the children (HSE 2000). A variety of literature has also been produced by the HSE to support the safety message. An example is ‘Stay Safe on Farms’ available in paper and electronic format free of charge. Safety weeks are organised around the country in school holidays to publicise the safety message to children and their families. Bredfeldt and Heath (1998) note the absence of adequate legislation where child labour is concerned, compared with that applied to the industrial sector, suggesting double standards. They put forward the figure of 23,000 children from American farms visiting the emergency rooms as a yearly average, noting peak ages of between 3-4 years and again at 13-14 years. This is quoted by Wilks (1993, supported by Schulman et al 1997 and Rivara 1985 ) who offered figures of 27,000 injured and 300 deaths per annum. In common with many other authors all of whom cite falling from moving equipment while a passenger as being common for the younger children whereas the older ones are more likely to be involved with roll­overs. Hawk and Donham (1994) ask for safe seats for extra riders in tractors believing that this may alleviate the problems of falls from moving equipment. Some modern tractors do have this facility; however, it remains against the law to allow a child younger than thirteen years to occupy such a seat, and may be regarded as a retrograde manoeuvre. Simply telling farmers not to let children ride in tractors is in conflict with their other responsibilities and demands.

Future legislation to safe guard young people may make employing them much more problematic in any area of work yet the difficulty will remain in applying protection for the curious.

3.7.2 Education and Behaviour

Schools are an excellent educational forum for the acquisition of social knowledge and skills and every effort should be made to work with a captive audience both rural and urban. Kelleher and Hope et al (2001) were principal investigators in a comprehensive research project conducted by the National University of Ireland, over four years, in Galway and Limerick. The project focused on all ages in the farming community but some observations were particularly useful and directed at children. One of the interventions studied for this research was the production and use of a video
and learning pack for the use of teachers and pupils in schools. The following assessment considered knowledge, beliefs and behaviours in primary school children. The age range of the children was 3-12 years and considered their views pre and post intervention. Evaluation of this strategy suggested that the materials had been well received and that the programme would be beneficial to mainstream life-skills and health education programmes thus enhancing knowledge. This approach is being extended in the geographical area as part of the Health Promoting Schools initiative, following the views published in the report from the Republic of Ireland from which some quotes are taken.

“significant changes in students attitudes and behavioural intentions occurred.”

Information via the media enter the home in the form of audio-visual and textual mediums and should be taken advantage of to produce child friendly material. The study in Limerick and Galway also held focus groups, with adult farmers and their spouses, first showing them a video and afterwards dividing the cohort into four groups. The opinions were evaluated for content, clarity and impact. Key points projected were

“Watching it makes you petrified, but you forget. You need reminding”.

“Keep away from machinery”

“The farm is not a playground”.

“Be aware of loose and baggy clothing”.

“The fall from the hay barn is frightening to a child but they should see it. If they see it they would be frightened, that is what you want.”

Discussion suggested that it might upset sensitive children, but to be effective it had to be powerful and frightening.

The legal age to drive a tractor is thirteen years, after watching this video one focus group said

“even though legal it was a lethal cocktail to put a young lad of sixteen or seventeen in charge of a powerful tractor.”

The dangers of animal behaviours were also examined and the risks recognised as serious. Groups concluded by making suggestions for a range of supporting materials including posters and computer aids to learning.

In addition to the above suggestions materials and literature are available from the HSE and the organisation is always willing to deliver programmes on safety matters, and consider new initiatives. The establishment of local rural safety action groups is advocated (Wolfendon and McKenzie 1992) and the completion of check lists by multi professional teams as well as families would seem useful as different perspectives are able to see problems in a different way. The Child Accident Prevention Trust (CAPIC) identifies that safety professionals have recognised that some farming injuries occur because children are doing tasks that exceed their abilities – “physical size does not determine maturity”, (CAPIC 2001, p3), Strueland and Lee et al (1996) reflect on the knowledge base held by parents when they are asked to make judgements about the ability of their children. The authors also suggest that parents believe their own offspring to be more capable than visiting children and therefore there may be the imposition of more hazardous expectation. Whether the children are their own or a visitors there is a failure to recognise that those younger than nine years have difficulty following directions and differentiating between, for example, right and left hands. The ability to
localise sound and recognise the importance and implications of peripheral movements also requires maturity. Children do not have the ability to process information and make decisions in the same way that could be expected from an adult. This is not realised by untrained parents and carers (Shutske 1994). A surprising omission from residency training for doctors in America and elsewhere noted that little information about the nature of rural accidents was included in training and yet the rural physician as a primary health care provider should be a proactive provider of education and information (Bredfeldt and Heath et al 1989 and Swanson and Sachs 1987). Schulman (1997 and Muxen et al 1992) urge those in education to reinforce the knowledge and understanding, both to children, their carer and supervisors, of child development both physical and cognitive, pointing out that children have a reduced sense of consequence, perceived immortality and invulnerability.

Many aspects of this literature review reveal that families are concerned with the safety of their children. Hawk and Donham (1994) suggest families ensure safety as best they can within the constraints of lack of adequate labour, access to safer machinery and reasonable and accessible childcare alternatives. To achieve success account must be taken of the entire social and economic factors that contribute to the problem of child injuries on farms. Salmi and Weiss et al (1989) recognised in their research the lack of resources applied to small family enterprises for safety development in comparison to large corporations such as mining. This industry, also high risk has considerably improved safety by making appropriate investments in the care of the worker.

For the identified approaches to be effective continued research and surveillance, data capture and the classification of injuries will aid understanding of the problem and allow for the development of awareness and educational interventions (Mercer 1998). The study by Schelp (1992) which used information obtained from a population-based surveillance study ongoing since 1978, was able to cover all emergency admissions to hospital and also emergency room care which included health centres, presumed by this study to be the equivalent of general practice in the UK. This highlights the importance of standardising data collection and also data capture in a reliable and consistent manner. The co-operation of all those working with patients in all categories and the employment of technology based data collection should make information gathering less arduous, standardised and useful. Stallones and Gunderson (1994) considered the epidemiological perspectives on childhood agricultural injuries within the USA. Their main observation within this study was the lack of compliant numerator and denominator in study design rendering the usefulness of such studies limited. The authors end by commenting

“there are very significant gaps in the epidemiological evidence collected to date relative to agricultural trauma. These gaps are so serious that present efforts to identify and focus child and adolescent intervention strategies may be seriously jeopardized.”

3.7.3 Engineering

Environmental and engineering initiatives were also regarded as important but at the time of the study only in an embryonic stage. Engineering and modern technology must be employed to make the working environment as safe as possible. A guard or cover correctly used will in many cases have been sufficient to avoid some of the reported accidents. Equipment is abused, Bredfeldt and Heath (1989, p 218)

“50% of grain augers had their safety covers removed.”

The fascination that young children have with moving parts means this type of equipment and also power take-off shafts (PTO’s) are implicated in the severest forms of injury.
SUMMARY OF ACCIDENT LITERATURE

PROBLEMS

- Home and workplace inextricably linked.
- Maintenance is costly and often makeshift.
- Guards and protections can be removed too easily and the machine continues to function.
- Farm profits do not allow for the employment of labour if family members are viewed as sufficiently competent.
- Childcare that is affordable and accessible is a problem especially under school age children which may account for the high risk group of the under four years. Older children need care during weekends, public holidays and school holidays, especially in the summer when production activity often peaks in a farm enterprise.
- Child development is not understood or addressed by farming families who assume a greater than sensible level of capability in children and even more their own children as opposed to child visitors.
- The present advisory body (HSE) is viewed with fear as an agency intent on enforcement. The image does not present the HSE as the experts for advice and guidance on how to work safely.

REMEDIES

- Organise safe effective accessible and affordable child care for farming families which recognises that farming is a seven day week occupation that is unable to stop for weekends and public holidays.
- Offer education especially to the children but include the parents to help in the understanding of child development both cognitive and physical to match tasks to the capabilities of the child.
- Use the National Curriculum and modern technology likely to be found interesting by children. The learning opportunities should be experiential.
- Examine ways of immobilising machinery which has been rendered unsafe due to guards etc being removed.
- Develop another section to HSE which is seen as a useful resource for assistance and completely disconnected from HSE as recognised at present.
- Recognise the financial imperatives for modern farming and offer incentives such as insurance benefits for safer working practices.
- Work closely with the contractor enterprise in farming which is the emerging way for many
family farms. These are organised companies which are a contained industry and more able to operate a safe occupational health and safe work place scheme.
CHAPTER 4

ZOO NOSES

In addition to accidents this study will aim to collect data on a range of zoonoses: diseases transmitted from vertebrate animals to man, as they have affected children. The connection between animal and human health is crucial to understanding emerging infections as over 75% of emerging infections are zoonoses. The reasons for increases in the zoonotic infections include an increasing world population, a reduction in the natural habitat for many animals, changes in animal husbandry, as well as globalisation (PHLS.CDC Weekly). Zoonotic disease is explored in the literature and as each disease is an independent entity they are viewed separately under different chapter headings. Obtaining information about the incidence of these diseases, as they occur in children, has been difficult except in a small number of high profile outbreaks. In these outbreaks thorough investigation of all the factors, plus proof of the route of transmission has been made available via research. Thomas and Salmon et al (1994) considered issues of exposure to animals and any association with illness in a rural population and noted the difficulty of claiming zoonoses as the route of infection. Serology and type of exposure information is rarely available to prove the connection. Frequently we blame the animal connection for illness, but this paper points out that in some cases,

“exposure to zoonoses can be beneficial as Edward Jenner proved two hundred years ago, finding that exposure to cowpox protected against smallpox”.

(Thomas and Salmon et al 1994)

There is a suggestion that the inward migration into farming communities may provide acquired generational immunity to exposure of low levels of infection in some illnesses, the paper suggests glandular fever and streptococcal disease. The authors also acknowledge the association between opportunity and illness citing exposure to rats and the higher incidence of leptospirosis in farming communities. Coleman (2000) when studying farmers noted that leptospirosis was not as high as might have been expected but that the occurrence of hantavirus was higher. Generally it is felt that the role of zoonoses and the resultant morbidity and mortality in humans is poorly understood. Farming families are constantly exposed to potential disease due to the environment in which they live and work plus the proximity of the working area to their domestic living arrangements.

Further investigation of any association between human disease and animals is very important. Farmers frequently invite members of the public to witness and even participate in farming activities. Advice is available, principally from the HSE. Nevertheless sometimes little provision has been made to address hygiene requirements or education into safe behaviours in potentially dirty and contaminated environments.

4.1 BACKGROUND

Agriculture is a hazardous industry and yet because it is frequently set in a domestic location, practices deemed unacceptable for industrial health and safety, pass unnoticed within the setting of the family farm.

The extenuating circumstances surrounding this situation will be examined in this study. The body of evidence accrued will be analysed to identify methods of reduction, where possible, of hazardous situations especially as they affect children.
As a population we are encouraged to access the countryside for leisure purposes. Therefore the risks of exposure to untoward events are not just to those working and living on farms but also to the wider population. This group does not have the agricultural background and the benefit of knowledge gained within familiar structures to facilitate safe behaviours in the countryside.

City children are particularly disadvantaged when they are required to understand the countryside as they may have had very little opportunity to visit it. Nurseries, playgroups, primary schools and other groups find that visits to the countryside, to farms, zoos and pets’ corners are very useful, educational and popular with their young clients. It cannot be denied that the visits are useful, but there are risks to be identified.

Everyone who uses the countryside is at risk from an accident or disease and there is a responsibility imposed on all concerned to make certain that health and safety remains a dominant consideration. By endeavouring to change behaviour as a result of education, information and vigilance the incidence of accidents and illness affecting those who live in and visit the countryside can be reduced.

4.2 EPIDEMIOLOGY AND ZOONOSES

There is considerable interest in many countries in the role of zoonotic illnesses and the effect it may have on human health. Many agencies in the United Kingdom including the Public Health Laboratory Services (PHLS) and Food Standards Agency (FSA), the Health and Safety Executive (HSE) and the Centre for Communicable Disease Surveillance (CDSC part of PHLS), have an interest in the epidemiological understanding of these disease processes, especially where there is a risk to human health. The true extent of the risks posed by zoonotic organisms in the UK in agricultural communities and those visiting them, is unknown, as also is the severity of the risks associated with zoonoses (Thomas and Salmon et al 1999). The European Community in 1992-1993 attempted to implement a number of proposals aimed at monitoring more effectively zoonoses in Europe. By 1996 member states were required to designate national reference laboratories for specified zoonoses.

A very comprehensive document, ‘Trends and sources of zoonotic agents in animals, feeding stuffs, food and man in the European Union in 1996’, informs the reader that surveillance strategies and reporting systems vary widely. Detailed assessment of food, particularly meat inspection is a key area of interest. Figures vary according to each countries method of sampling, analysis, and reporting making comparisons between member states unreliable.

This review of the available literature aims to present an overview of the present knowledge, applied to the diseases to be studied in this research. The emphasis will be on the incidence in children, the zoonotic nature of the exposure, particularly referenced to the geographical areas of this study.

4.2.1 Exposure

Human activity and their association with animals and their environments has altered over time especially as people have become more mobile. Travel both in this country and abroad has altered the risk exposure as applied to human health and also the variety of diseases considered to constitute a risk to health, Thomas and Joynson (1994) suggest a possible forty zoonoses as risks to human health. In the last decade visits to farms for leisure and educational purposes with the concept of interactivity for many groups in our society have increased thus creating contact with different environments where exposure to diseases has been previously limited. An example of this is the ‘pets corner’ or farm within a zoo, or visiting working farms to see and participate in the range of work activities normally taking place there. Here the risk is significant due to the large numbers of
visitors – estimated at 13 million in England and Wales in 1998 alone. Barker (1998) provides a figure of between four and ten million people per year, higher at lambing times and weekends. Rural working farms tend to be the most attractive but also city farms, rare breed centres and animal and bird sanctuaries are increasing in number. The public also ramble in the countryside, visit music festivals and camp on land used by animals.

The increased interest in the epidemiology and disease surveillance applied to zoonoses (those passed from vertebrate animal to human), is drawing attention to fresh ailments and to what appears to be an increased incidence. The Department of Health (1994) provided a definition of an outbreak of disease as an incident where two or more people experience a similar illness resulting from a common single source exposure.

4.2.2 Risks at Production Level as Opposed to Risks from Food Handling and Storage.

The enquiry into zoonoses becomes blurred when food becomes infected as part of the creation of the product. Beefburgers have been found to constitute a risk, especially when under cooked. This is because particles of animal flesh from the outside of the animal, which may be contaminated with faeces, have become mixed within the mince and no longer reside on the outside of the product, but are inside where they might not be exposed to sufficient heat in cooking to kill the bacteria. However the risk is not from improper food handling but rather the contamination of the meat by the animal it was from, as in this case the faeces were contaminated with disease causing organisms. Investigation of this situation would make the zoonotic link with an apparent food-borne incident (DOH, 1991). However if the beefburgers acquired the organisms as a result of incorrect storage, contamination with flies or by being beyond the recommended sell by date then the true zoonotic nature of the incident is doubtful. Further if the food handler passed organisms to the food from their hands, previously contaminated with organisms from behavioural sources the disease would not be zoonotic. For outbreaks of infection attributed to any of these causes, and to make the zoonotic connection investigators must confirm the route of spread. Cryptosporidium, an intestinal parasite protozoon was first identified in 1976 as a human pathogen (Nime and Burek et al 1976). Salmonella and campylobacter are others contracted in a similar way, and also presenting with similar symptoms, in various degrees of severity. They could be called ‘hand to mouth infections’ as this is the method of transmission either because of contact with infected material from animals, their waste products or the environment where they live or graze. Food borne infection is also due to the contamination of food, water, milk and milk products. This can occur during production, storing, cooking inadequately and storing inappropriately that which has been contaminated by a hand or tool previously in contact with infective material, and then placed in an environment ideal for the replication of the bacteria, which has been the contaminant. The Food Safety (Temperature Control) Regulations (1995) state that chilled food should be kept in a refrigerator maintaining a temperature less than 8 deg Celsius. In addition food kept for serving hot should be maintained above 63 degs Celsius. All products have a considered safe shelf life and the dates by which consumption should take place are clearly stated on the packaging. Frozen food should never be defrosted and then frozen again without first being cooked. Freezing only allows the organisms contained in food to be dormant therefore remaining below pathogenic levels. As the food warms up the environment becomes ideal for the replication of bacteria to recommence achieving pathogen levels.
4.2.3 Three Pathways for Infection

A report compiled by the Microbiological Safety of Food Funders Group, (MSFFG) using a range of research by public funded organisations over a period from 1990 to June 1999 aims to identify the transmission routes and notes food borne transmission, person to person spread, and environmental spread as the main groups but suggests that the relative magnitude of the three pathways in importance, is not yet fully understood. Smith and Palmer (1996) noted that reporting is voluntary and that laboratory proof of zoonotic connection only represents a fraction of the actual cases occurring in the community. Further, laboratory proof is not always requested by clinicians to accurately culture or serologically type the organism. Clinically the patient has a gastro intestinal infection and not all patients report excreting blood in their stool and Chalmers and Parry (1999) state the point that there is value in testing all acute phase faecal specimens. Full recovery will frequently ensue following conservative treatment. Clinicians also note that many patients will not need to consult them about the rather transient gastric upset experienced therefore precluding accurate data collection, (Wheeler and Sethi et al 1999). Infection within family members may occur as a result of a primary infection, zoonotic or food borne, affecting one individual who is able then to pass it to other family members. This is similarly the case for groups in schools, nurseries and care establishments. To further complicate the epidemiology, carrier status may be acquired by some individuals, particularly those in regular contact with animals such as farmers and their families, meaning that they are capable of transmitting the infection to others, by the contamination of a hand to mouth product, but remaining asymptomatic themselves.

Zoonoses, when proven, are traced back to the animals (vertebrates) or their environment and waste products. PHLS noted that VTEC 0157 can survive for over twelve months in cattle faeces and for over twenty weeks in the soil. Contamination of the soil should include reference to all animals including domestic and farm pets. In addition the infection carried by the animals may be sub clinical and therefore they do not demonstrate any illness (Pritchard and Fleetwood 1995). It is quite likely that those individuals caring for the animals will not be ill although they may have antibodies to the disease, revealed by serology, indicating an episode in their past which may not have made them sufficiently ill to have been noticed (Thomas and Salmon, 1999). A chart by Walker et al. (1992, cited by Thomas and Salmon 1998, p380), shows clearly the sero prevalence in farm contacts compared with control groups for Toxoplasma Gondii (Table 13). This just one of a range of zoonoses they included in their study. It is of interest here because it clearly indicates that the farming group have the greater percentage of cases of this particular zoonosis and this gives an expected correlation with other zoonoses. This might be helpful when trying to differentiate the food borne illness from the zoonotic.

Table 13
Age-specific seroprevalence of Toxoplasma gondii in the farm group (cohort 1), in an urban comparison group of ambulance and police workers, in a population sample.

<table>
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<th>Age Bands</th>
<th>Farm</th>
<th>Police</th>
<th>Pop. Sample</th>
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<tr>
<td>11-20yrs</td>
<td>12%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>21-30yrs</td>
<td>30%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>31-40yrs</td>
<td>38%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>41-50yrs</td>
<td>52%</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>51-60yrs</td>
<td>65%</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>61-70yrs</td>
<td>70%</td>
<td>0%</td>
<td>35%</td>
</tr>
<tr>
<td>&gt;70yrs</td>
<td>60%</td>
<td>0%</td>
<td>48%</td>
</tr>
</tbody>
</table>
It is difficult in all cases of gastrointestinal infection to be absolutely certain about the route of infection. It is known and accepted that animals do constitute a major risk. However there have been occasions when milk has been infected as a result of bird pecking. It is also accepted that all of the gastrointestinal infections can be transmitted as food-borne organisms. Secondary transmission is also very probable within families and groups. To add to the difficulties many open farms and other venues for public access have catering facilities and ice cream vending on site. The food handling element must be excluded before zoonoses as a cause can be claimed. It is also important that workers involved in catering do not involve themselves with the animals, or their environments as yet another variable in the risk factors can be created.

Visitor figures to open farms and visitor attractions of this nature are large, Dawson and Griffin claimed in 1995 that some of the bigger farms attract two hundred and fifty thousand in a single weekend, and that an annual number verging on ten million may have been appropriate at the time of writing their paper. The public may also come into close contact with farm livestock and other domesticated and wild animals found on farms while walking on footpaths or bridleways across farmland, camping in fields, or visiting 'pick-your-own' farms for fruit and vegetables.

4.2.4 Route of Entry

The human body is designed to have internal protection from assault by disease. It is only when the outer covering cannot resist, is damaged, or the internal environment is altered by treatments for other conditions, changed acid balance or impaired immune function that undesirable organisms enter and achieve pathogenic status. While many of the zoonotic illnesses to be described in this study are troublesome via the ingestion of pathogenic organisms other possible outbreaks of disease are described in papers reviewed for the study, as caused by the inhalation of pathogens. Absorption through the skin which is undamaged, an open wound, bite or via the conjunctive in the eye are other vulnerable areas where zoonotic disease can enter the human body. The following chapters will examine the literature available for this study taking each disease separately as they appear on the questionnaire for this study.
CHAPTER 5

VERO CYTOTOXIN E. COLI 0157 (VTEC 0157) *Escherichia coli*

VTEC 0157 is a particularly damaging strain of Escherichia coli (E. coli) and although the incidence of disease in humans is small the morbidity and mortality is significant for those afflicted, and there is some suggestion from historical data that the incidence is increasing. The Pennington Report (1997) explains that E. coli bacteria are found in the digestive tracts of most human beings and animals. There are hundreds of different strains of E. coli and usually these bacteria are harmless. Some strains of E. coli produce toxins known as Vero cytotoxin producing E. coli (VTEC). E. coli 0157:H7 is a particularly nasty strain which is capable of causing serious illness in humans, especially the very young, the elderly and the immuno-compromised. These bacteria are capable of invading the gut and can produce a toxin that may lead to kidney failure as a result of haemolytic uraemic syndrome (HUS). The Public Health Laboratory Services (PHLS) report in March 2000 indicated that about 10% of infections with VTEC 0157, had been acquired abroad. They also chart the incidence of VTEC 0157 in the United Kingdom over six years, from 1992 –1997 clearly showing the increased incidence. It is also recognised that E.coli can survive in the guts of healthy cattle and sheep. The animals are usually unaffected but they may transmit the infectious agent in their faeces, or as a result of the contamination of their environment, their coats and housing structures plus the pastures grazed. Table 14 below gives an indication of the increased incidence in years 1996 –1998.

Table 14

Human strains of VTEC 0157 in England and Wales received per month by Laboratory of Enteric Pathogens, (LEP).

<table>
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<td>January</td>
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<td>February</td>
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</tr>
<tr>
<td>July</td>
<td>75</td>
<td>112</td>
<td>140</td>
</tr>
<tr>
<td>August</td>
<td>100</td>
<td>220</td>
<td>138</td>
</tr>
<tr>
<td>September</td>
<td>150</td>
<td>236</td>
<td>110</td>
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<tr>
<td>October</td>
<td>75</td>
<td>115</td>
<td>75</td>
</tr>
<tr>
<td>November</td>
<td>65</td>
<td>65</td>
<td>70</td>
</tr>
<tr>
<td>December</td>
<td>55</td>
<td>36</td>
<td>25</td>
</tr>
</tbody>
</table>

(PHLS 2000: Vol3; No1, p15)

The geographical distribution is indicated in Table 15 below. Again the trend appears to be for an increased incidence. It must be remembered that there is a greater awareness of the condition and more diagnosis may be being confirmed. Also for the purposes of the PHLS study the differentiation between sources of disease are not made.
Table 15 Geographical distribution of VTEC 0157 isolated in the United Kingdom: 1992-1997 (rates per 100,000)

<table>
<thead>
<tr>
<th>Region</th>
<th>1992 No</th>
<th>Rate</th>
<th>1993 No</th>
<th>Rate</th>
<th>1994 No</th>
<th>Rate</th>
<th>1995 No</th>
<th>Rate</th>
<th>1996 No</th>
<th>Rate</th>
<th>1997 No</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern and Yorkshire</td>
<td>77</td>
<td>1.13</td>
<td>62</td>
<td>0.91</td>
<td>75</td>
<td>1.13</td>
<td>126</td>
<td>1.90</td>
<td>109</td>
<td>1.64</td>
<td>150</td>
<td>2.26</td>
</tr>
<tr>
<td>Trent</td>
<td>64</td>
<td>1.35</td>
<td>43</td>
<td>0.90</td>
<td>41</td>
<td>0.86</td>
<td>65</td>
<td>1.36</td>
<td>105</td>
<td>2.19</td>
<td>136</td>
<td>3.25</td>
</tr>
<tr>
<td>Anglia and Oxford</td>
<td>77</td>
<td>3.65</td>
<td>38</td>
<td>0.81</td>
<td>55</td>
<td>3.04</td>
<td>63</td>
<td>1.19</td>
<td>82</td>
<td>1.17</td>
<td>113</td>
<td>2.13</td>
</tr>
<tr>
<td>North Thames</td>
<td>21</td>
<td>0.28</td>
<td>25</td>
<td>0.34</td>
<td>28</td>
<td>0.41</td>
<td>43</td>
<td>0.63</td>
<td>30</td>
<td>0.73</td>
<td>94</td>
<td>1.37</td>
</tr>
<tr>
<td>South Thames</td>
<td>34</td>
<td>0.50</td>
<td>40</td>
<td>0.60</td>
<td>23</td>
<td>0.34</td>
<td>55</td>
<td>0.81</td>
<td>46</td>
<td>0.68</td>
<td>71</td>
<td>1.05</td>
</tr>
<tr>
<td>South and West</td>
<td>49</td>
<td>0.78</td>
<td>45</td>
<td>0.69</td>
<td>67</td>
<td>3.03</td>
<td>165</td>
<td>2.31</td>
<td>110</td>
<td>1.68</td>
<td>162</td>
<td>2.47</td>
</tr>
<tr>
<td>West Midlands</td>
<td>44</td>
<td>0.83</td>
<td>56</td>
<td>1.06</td>
<td>46</td>
<td>0.87</td>
<td>106</td>
<td>2.00</td>
<td>37</td>
<td>1.07</td>
<td>137</td>
<td>2.58</td>
</tr>
<tr>
<td>North West</td>
<td>72</td>
<td>1.12</td>
<td>45</td>
<td>0.70</td>
<td>50</td>
<td>0.76</td>
<td>88</td>
<td>1.33</td>
<td>85</td>
<td>1.29</td>
<td>161</td>
<td>2.43</td>
</tr>
<tr>
<td>England</td>
<td>438</td>
<td>0.9</td>
<td>354</td>
<td>0.73</td>
<td>385</td>
<td>0.79</td>
<td>711</td>
<td>1.45</td>
<td>624</td>
<td>1.28</td>
<td>1044</td>
<td>2.13</td>
</tr>
<tr>
<td>Wales</td>
<td>32</td>
<td>1.10</td>
<td>33</td>
<td>1.07</td>
<td>26</td>
<td>0.89</td>
<td>83</td>
<td>2.78</td>
<td>36</td>
<td>1.23</td>
<td>43</td>
<td>1.47</td>
</tr>
<tr>
<td>Scotland</td>
<td>115</td>
<td>2.25</td>
<td>108</td>
<td>2.11</td>
<td>217</td>
<td>4.23</td>
<td>206</td>
<td>4.01</td>
<td>475</td>
<td>9.25</td>
<td>422</td>
<td>8.23</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>1</td>
<td>0.06</td>
<td>2</td>
<td>0.12</td>
<td>3</td>
<td>0.18</td>
<td>7</td>
<td>0.42</td>
<td>14</td>
<td>0.85</td>
<td>31</td>
<td>1.86</td>
</tr>
<tr>
<td>Total</td>
<td>586</td>
<td></td>
<td>495</td>
<td></td>
<td>831</td>
<td></td>
<td>1003</td>
<td></td>
<td>1149</td>
<td></td>
<td>1540</td>
<td></td>
</tr>
</tbody>
</table>

(PhLS March 2000: Vol3; No1, p15)

More relevant comment associating figures with farm visits is made by (Pritchard 2000) by providing a figure for an incidence of 51 in England and Wales during the period 1994-99, commenting that it is small but important. In his opinion the small chance of a visitor, particularly a child, developing serious illness from VTEC 0157, needs to be balanced against the undoubted benefits of farm visits. The group considered at risk is often young children, either pre school age or in infant departments. Many scientific papers suggest that the most at risk group for infection and serious consequences indicated by Table 16 are the under five year age group, PhLS (2000).

Table 16 Age and Sex distribution of cases of VTEC 0157, Wales, 1990 – 1998

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>24 (7.9, CI = 4.9 -11.9)</td>
<td>13 (8.3)</td>
<td>11 (7.5)</td>
</tr>
<tr>
<td>1 - 4</td>
<td>117 (9.0, CI = 7.4 -10.7)</td>
<td>71 (10.7)</td>
<td>46 (7.2)</td>
</tr>
<tr>
<td>5 - 14</td>
<td>56 (1.6, CI = 1.2 -2.1)</td>
<td>32 (1.8)</td>
<td>24 (1.4)</td>
</tr>
<tr>
<td>15 - 24</td>
<td>44 (1.4, CI = 1.0 -1.8)</td>
<td>19 (1.1)</td>
<td>25 (1.6)</td>
</tr>
<tr>
<td>25 - 34</td>
<td>44 (1.2, CI = 0.8 -1.6)</td>
<td>19 (1.1)</td>
<td>25 (1.3)</td>
</tr>
<tr>
<td>35 - 44</td>
<td>30 (0.9, CI = 0.6 -1.2)</td>
<td>14 (0.8)</td>
<td>16 (0.9)</td>
</tr>
<tr>
<td>45 - 54</td>
<td>33 (1.0, CI = 0.7 -1.3)</td>
<td>11 (0.6)</td>
<td>22 (1.3)</td>
</tr>
<tr>
<td>55 - 64</td>
<td>25 (0.9, CI = 0.6 -1.5)</td>
<td>10 (0.7)</td>
<td>15 (1.1)</td>
</tr>
<tr>
<td>&gt;65</td>
<td>35 (0.9, CI = 0.5 -1.1)</td>
<td>15 (0.9)</td>
<td>20 (0.8)</td>
</tr>
<tr>
<td>Total (mean)</td>
<td>415 (1.6, CI = 1.4 -1.7)</td>
<td>207 (1.6)</td>
<td>208 (1.5)</td>
</tr>
</tbody>
</table>

(Chalmers and Parry 1999,p568)

A major population survey was conducted in Wales for the period 1990-1998, with all first time acute phase faecal specimens tested for VTEC 0157. The objectives of this surveillance being to determine the incidence of VTEC 0157, identify outbreaks of infection and describe the persons involved and
the microbiological characteristics of the isolates, (Chalmers and Parry 1999). The authors support
the PHLS comments with regard to age related risks and suggest a figure of 8.8% per 100,000
population. For children, they also direct attention to the seasonal occurrence highest in July, August
and September.

Chalmers and Parry (1999) supply a breakdown of the finding by source of outbreak revealing that
none of the cases were zoonoses. The majority of transmission routes shown in the study in Wales
were person to person, frequently in institutionalised settings. Figures in parentheses are mean
annual rates per 1000,000 population, followed by 95% confidence intervals (CL) for age specific
rates (Table 16).

E coli 0157 (VTEC 0157) was first recognised as a human pathogen in Canada in 1977 according to
Konowalchuk and Statarvic (1997). They noted the particularly potent cytotoxins present in the
strain active on the vero cells. Riley and Remis et al (1983) reported in 1982 a first recognition in the
USA, of the serious consequences of this serotype pathogen for human health. The Advisory
Committee on the Microbiological Safety of Food in the UK (1995) noted that in 1986 there were 76
cases in England and Wales and The Communicable Diseases Report (CDR) 1998 noted this had
risen to 1087 cases in 1997. Figures from the PHLS for the UK for 1999 had risen to 1,429 cases.
These figures do not apply to zoonoses alone, they incorporate any reason to have contracted VTEC
0157 infection including food-borne transmission.

Study over the past few years has established that animals, particularly ruminants, are a source of
VTEC 0157 for the human population. The organism rarely causes disease in animals, it is carried by
them as an inapparent infection (Scudamore, 2000). Given the seriousness of human VTEC
infection, the lack of therapeutic options and the apparent lack of control measures for the animal
reservoir, blocking transmission pathways is an essential avenue which must be explored to reduce
the morbidity and mortality from this serious disease (O’Brien, 2000).

In the period 1992-1994 seven outbreaks were recorded in England and Wales involving one
hundred and seventy three people, this compared to the period 1989-1991 where seventy-six people
were involved as a result of eighteen outbreaks (Wall and McDonnell 1996). From these eighteen
outbreaks there was evidence of a zoonotic route for two of them. One from a farm visit where two
were ill, both children, and the other from contact with cattle when seven were ill, five of whom were
children. A further case involved a scout camp and this may have also had zoonotic links resulting
from camping on infected pasture. In this case three children were ill. A further outbreak recorded
as food-borne involved a zoo with a pets’ corner. Findings on the meals analysed proved negative. It
was known that the five children had been in contact with calves and goats in the pets’ corner, but
proven links were not established.

A epidemiological investigation in West Hertfordshire following a spate of infection in three children
with VTEC 0157 in 1997 also made very firm links with farming activity. One of the children lived
on the farm and two were visitors to the open farm in school parties. All had been in direct contact
with farm animals and all were admitted to hospital with diarrhoea. Two subsequently developed
HUS one of whom was left with severe neurological impairment. The investigation was able to
categorically link the phage type 21, as isolated from the three children, to the samples taken from
the goat paddock and two cows at the farm. The isolates were indistinguishable by molecular typing,
(Milne and Plom 1999).

To establish the zoonotic route proof must be obtained that the bacteria, recovered from patient
samples, especially sub group typing, are identical to that which may be obtained from the animals or
environments concerned. Identical links to the phage type rendering the samples indistinguishable
from each other must be obtained. Not all laboratory testing incorporates the same degree of skill
and facility to isolate the phage types and negative samples have been obtained which subsequently can be determined as positive, under more sophisticated conditions of testing. This was the case for a three year old boy who had samples taken three days after admission to hospital. No pathogens were isolated to explain the symptoms of severe diarrhoea and vomiting, plus stomach cramps. However the sample sent to the Enteric Pathogens Laboratory did yield the pathogens for VTEC 0157, Trevena and Willshaw (1996). It has been recommended in several papers examined for the literature review that rigor in culture is essential with the suggestion for the use of Sorbitol MacConkey agar (Oxoid, Basingstoke, UK) and incubated at 37 deg C follows for eighteen hours. Laboratories were further asked to send all presumptive VTEC 0157 isolates to the Laboratory of Enteric Pathogens, Central Public Health Laboratory, London for confirmation, phage typing and Vero cytotoxin typing (Thomas and Cheasty 1996). The establishment of such specialist laboratories was a recommendation from the European Parliament in 1996. Every patient presenting at their medical practice with gastic symptoms and diarrhoea should have samples tested however reconciling the cost is a major issue when many of these cases would respond to conservative treatment. Statistics would remain inaccurate as many cases never seek professional advice.

One example of a successful investigation conducted in Wales focused on a three year old girl who after a farm visit became ill and was subsequently diagnosed with 0157 VTEC infection. Parry and Salmon (1995) noted the likely route of transmission was the fur of the farm dog which had been extensively petted by the girl, prior to the consumption of her packed lunch, without first washing her hands. A faecal sample from the child yielded a strain of E. coli 0157 of a phage type subsequently yielded by a number of the farm cattle. The strain from one particular animal was identical to that of the samples from the child. However there was no evidence whatsoever of the child being in contact with the cattle or their faeces. The assumption was that the dog was the carrier. Parry and Salmon et al also cite another article by Synge and Hopkins (1993) indicating a dog from a farm as a plausible route of transmission of E. coli 0157 to a child, this time in Scotland.

A major study was conducted in Cornwall by the Environmental Health Department of Kerrier District Council, which lasted form 1994 –1997. This study employed case control sampling alongside on farm investigation including environmental sampling. The conclusions stated by Trevena (2001) are

“statistical and microbiological findings give strong support to the study hypothesis that there is an association between human infection with vero cytotoxin producing Eschericia coli 0157 and direct and indirect animal contact.”

The report also noted the high risk factors for children aged 1-14 years who have contact with an animal or pet which has visited a farm, or actually visiting a farm themselves.

Here the study population was based on a catchment area invaded by tourists for the summer months, a time when sixty-nine cases of haemorrhagic colitis emerged, four of which developed HUS. Twenty-six cases were admitted to hospital. Three of the four HUS cases were boys under two years of age. Twenty-three cases were linked to farms. In one case a child had played with a ball that had probably come into contact with cow faeces in a field next to a cottage that they rented. Faecal contamination was attributed to thumb sucking. E. coli 0157 was isolated from cow pat samples taken from the field. Another victim, a student admitted to eating his sandwiches without first washing his hands. Further examples included a woman who drank untreated milk, and someone who drank water from a stream, thought to be contaminated from contact with a farm dog. Slurry samples that were taken from calves provided fourteen positive samples. The results from this study showed that farming families and workers, tourists and casual farm visitors were all associated with zoonotic transmission of VTEC 0157, and supported the view that cattle constituted a reservoir of VTEC 0157 in this study area. Evidence was also revealed that transmission from a pony and a dog
suggested that they acted as vectors in the transmission of VTEC 0157 infection. The infections described in this study were all sporadic but were found to be linked by separate visits to the same farm, as were the secondary infections, where other family members were infected following a visit to a farm by a thirty-five year old male who was later ill. He also admitted to regularly drinking unprocessed milk, in his tea, at the processing plant where he worked. The farm he had visited was associated with a further case, six weeks later, in another individual (Trevena and Willshaw 1999).

The study in Cornwall was extensive and conducted over three years. However out of 63,000 stool samples taken on suspicion only 111 cases were confirmed. This number is not large and the majority of cases do recover without difficulty. However there is no treatment available apart from care and fluid replacement. Those few who develop Haemolytic Uraemic Syndrome (HUS) are severely ill and for many of these life threatening developments occur which can only be treated with organ system support. If those individuals survive they may suffer permanent damage. Therefore although the severe cases are small in number they are very important in influencing policy change.

The Cornish study endorsed the view of other researchers who note that the peak risk period for this infection is the hotter months of the year. The period for the UK is June to end of August. Consideration of the incidence by area over three years showed that Scotland consistently has higher incidence per 100,000 population. The only area scrutinised for this study to show a reduction in incidence during this three year study period was Wales (Table 17).

### Table 17

Annual Incidence Rates of VTEC 0157 per 100,000 Population (Comparison with Regional/National Figures).

<table>
<thead>
<tr>
<th>Region</th>
<th>1995</th>
<th>1996</th>
<th>1997</th>
<th>3 Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Area</td>
<td>3.7</td>
<td>3.7</td>
<td>3.5</td>
<td>3.6</td>
</tr>
<tr>
<td>South West Region</td>
<td>2.64</td>
<td>2.46</td>
<td>3.09</td>
<td>2.73</td>
</tr>
<tr>
<td>England</td>
<td>1.45</td>
<td>1.28</td>
<td>2.13</td>
<td>1.62</td>
</tr>
<tr>
<td>Wales</td>
<td>2.78</td>
<td>1.23</td>
<td>1.47</td>
<td>1.83</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>0.42</td>
<td>0.85</td>
<td>1.86</td>
<td>1.04</td>
</tr>
<tr>
<td>Scotland</td>
<td>4.01</td>
<td>9.25</td>
<td>8.23</td>
<td>7.16</td>
</tr>
</tbody>
</table>

(Trevena, 2001)

The examination of age factors in the Trevena work also indicates that males in age group 1-15 years are much more vulnerable to infection than females and clearly the 1 –14 years group is the highest risk sector. This compares well with work by Chalmers and Parry (1999) and that of the PHLS (2000) quoted earlier in this report. However the change that takes place in the over twenty-five age range onwards, where females are the greatest casualty, as shown in Table 18 is not explained.
Table 18

Age / Gender Distribution of Total Primary E. coli VTEC 0157 cases over three years. (Trevena, 2001)

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>M</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1-4</td>
<td></td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>5-14</td>
<td></td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>15-24</td>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>25-34</td>
<td></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>35-44</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>45-54</td>
<td></td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>55-64</td>
<td></td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>65+</td>
<td></td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

Reilly and Locking et al (2000) report on a three year case control study initiated in Scotland between 1996-1999. They report that forty-four percent of cases in this study were children under ten years of age. Of the total cohort of cases eight percent developed HUS and all but one of these were children.

In 1994 four cases of bloody diarrhoea attracted the attention of communicable disease surveillance in Nottingham and Leicestershire. Initially there was one adult case and three children who presented as symptomatic. All had visited a farm visitor centre in Leicestershire in the three weeks before they became ill. A further three cases were identified who were associated with visiting the same farm. Case finding eventually yielded a further three adults and twenty-five children who all had a range of symptoms from mildly ill, to HUS in two cases aged two and five years respectively. These cases may have emerged as secondary contacts from within the families of those affected. A firm belief that this outbreak was connected to the farm visitor centre, in the first seven cases, led to the investigation. The farm was the only common feature, faecal specimens were obtained and tested from the animals and looked especially for E coli 0157. In addition the food preparation and hygiene arrangements were assessed and passed as satisfactory. Commonality in all but one case was that those affected remembered stroking and feeding the animals. Eventually an indistinguishable strain of ecoli 0157 was isolated from four of the seven human cases plus four cattle and six goats.

In Canada, reported by Renwick and Wilson (1993) a case emerged of E.coli 0157 in a boy of thirteen months who lived with his parents on a farm whose business involved buying and fattening veal calves. This child was hospitalised for nine days but recovered well. Other family members who also later presented with symptoms were his five year old sister who was treated and nine year old brother who although symptomatic recovered spontaneously. The mother noted to the researchers that the younger child did stroke the calves when in the barn with her and also was known to put his fingers in his mouth. Three of the seven calves showed positive culture to VTEC 0157 in their faeces and one out of the three isolates obtained from these samples was identical to the sample from the child providing strong evidence of the route of infection from animal to child. The other family members who became ill may also have contracted their illness this way although the route is not clear for them, it could have been that they became infected from within the family.

In May 2000 a scout camp was held at New Deer Agricultural Showground in Aberdeenshire. The camp was attended by three hundred and thirty-seven people and was intended to run for three days. The length of stay at the camp was reduced by a day due to atrocious weather conditions, resulting in ground water accumulation, flooded and muddy conditions. The showground had been very recently grazed with sheep and the ground was heavily contaminated with sheep dung. Even though the camp duration was quite short about fifty people reported gastro-intestinal symptoms and twenty attendees were later confirmed as having VTEC 0157. This organism was isolated from sheep faeces, lying water, soil, wellington boots and debris from the climbing frames. The isolates were indistinguishable from the human forms. The report by Grampian Health Board (2000) into this incident noted that hand washing activity was poor even though facilities were in place. Food was
eaten using fingers rather than forks in many cases.

Farms, zoos and pets have been implicated in the zoonotic aspect of the transmission of VTEC 0157 and a further paper by Chalmers and Salmon (1997) focuses on horses as a risk. They cite an example of an elderly farmer who became ill after working with horses excreting bloody diarrhoea. Phage typing of the samples from the horses and the man suggested the samples were indistinguishable and that therefore one had infected the other. The authors suggest that horses are not usually investigated for carriage of VTEC 0157. Given the high degree of handling and the large numbers of children who have contact with them there is a need for a greater awareness that horses can act a vehicle for VETC infection in humans. Trevena and Hooper (1996) also recorded a case involving horses, this time in a child.
CHAPTER 6
COMMON GASTRO INTESTINAL INFECTIONS

6.1 SALMONELLA  Salmonella

Salmonella enterica, a pathogen causing considerable morbidity and mortality, is regarded as a zoonosis of world wide economic importance for humans and animals. Salmonellae are readily transferred from animal to animal, animal to human and human to human by direct or indirect pathways (Clarke and Gyles, 1986). In addition, for a small number of victims Reiter’s Syndrome can result lasting for months or years presenting as chronic arthrititis.

An Integrated Study in Canada (1995) reported on gastrointestinal infections looking at the causes and dissemination of three infections, salmonella, campylobacter, and VTEC 0157 finding that all three were zoonotic food-borne afflictions. The risk factors listed were foreign travel, restaurants, day and institutionalised care facilities, the home and work place. Salmonellosis infection is transmitted in food particularly poultry and egg products which are undercooked and consumed or that which is stored incorrectly by not being in a sufficiently cool environment. It is estimated that 35% of all raw poultry on the market is contaminated with salmonella from the birds digestive tract and transmitted through faeces (Glickman 1998). Zoonotic transmission routes via unpasturised milk and cheese are other products implicated in salmonella outbreaks, as are egg dishes which are under cooked.

In addition to the obvious oral ingestion some routes for transmission of salmonella are surprising, for example an open cut, sore or wound, contamination via the eye, inhalation of aerosols, contaminated fomites, ingestion of soil or water contaminated with infected faeces.

Pets can be regarded as reservoirs for salmonella and particularly warm blooded pets, such as birds as indicated in Table 19, have been noted in the Canadian study (1995) to cause transmission of illness. In the UK, in year 2000 thirty-two children in nursery in Newcastle upon Tyne, aged between two and four years, were diagnosed with salmonella enteritis as a result of exposure to ducklings and chicks which all originated from one farm (CDR 2000). They are thought to have become infected as a result of handling the birds, something they had been instructed not to do.

Table 19
Salmonella Associated with Pets in Canada in 1995

<table>
<thead>
<tr>
<th>Pets</th>
<th>Birds</th>
<th>Horses</th>
<th>Dogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm Blooded</td>
<td>54</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Turtles</td>
<td>6</td>
<td>17</td>
<td>17</td>
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Cold blooded animals, including tropical fish and reptiles which are becoming popular as exotic pets have been recognised as a source of human salmonellosis over the last forty years (Ward 2000). The first human infection from a turtle was recognised in 1963 in the USA (CDC Report 1963, cited by Ward 2000). From this date forward there has been a suggested five fold increase in reptile associated salmonellosis. During the early 1970’s baby turtles as pets became very popular in America.
and other countries. An estimate from the U.S.A, in Morbidity and Mortality Weekly, at that time states that 4% of all U.S. families owned one or more baby turtles and 14% of salmonellosis cases where attributed to this type of exposure. During the 1960’s and early 1970’s some quarter of a million infants and small children were diagnosed as having turtle-associated salmonellosis. By 1975 legislation in the U.S. restricted the sale of these turtles but by 1986 the popularity of green iguanas and other reptiles had increased to parallel previous turtle ownership and the consequent risks of disease. In 1995 the Health Dept of the U.S. examined unusual cases of salmonellosis in thirteen states where there had been contact with reptiles (CDC 1995 and 1999). Several of the cases were very young children who had contracted the salmonella as a result of secondary contact with their parent or carer who were carriers of the infection, yet not ill themselves. In one case a baby born prematurely, and found later to be positive to a strain of salmonella went on to infected another child in the baby care unit due to lack of hygiene. The original case became infected from his mother. They also discovered that practices for cleaning the environment or housing of the reptile in the domestic situation were far from ideal in many cases, for example the kitchen sink being used for the disposal of infected water. Fomites are a major problem, for example the floor where spillage may have occurred which is then crawled on by an infant.

In the UK the Public Health Laboratory Services (PHLS) noted in the first quarter of 2000 six cases (five children and one adult) who had acquired salmonella infection from reptiles. Three of the infants developed meningitis and two of these died as a result. One death of a victim aged four months resulted from salmonella Poona isolated in brain tissue and matched with a pet lizard owned by the child’s grandmother. Forty similar infections, resulting in illness, were noted in 1999 and a further eleven cases have been reported in 2000 (CDR Weekly 2000). The other victim aged three weeks resulted from salmonella Rubislaw connected to a pet water dragon lizard. Salmonella Tel-el-Kebir affected seven children and one adult which Lynch and Daly et al (1999) reported on in Northern Ireland and was associated with terrapins imported from America.

6.2 CAMPYLOBACTER *Campylobacter jejuni*

Animals and birds destined to be food which are undercooked, are the major reservoirs of campylobacter for human infection. Also major risks are the consumption of untreated milk and unchlorinated water. In such examples there would not be zoonotic exposure. The contaminants would be food borne. However if the products such as untreated milk and water have been contaminated by animal faeces, and this is the scenario which precipitates the infectious episode then zoonotic transmission will be claimed as the cause. The bacteria survive well in an anaerobic, neutral Ph environment and a temperature of 4-10 degrees Celsius. Temperatures above 74 degrees Celsius kill the bacteria. (Microbiological Safety of Food Funders Group, 2000). This report highlighted risk factors for contracting campylobacter and listed them as foreign travel, contact with young pets especially puppies and kittens, undercooked chicken, bird pecked milk, salads and fresh fruit, rice and pulses plus the domestic water jug containing stale water. Swimming in contaminated lake water was noted in the Canadian Integrated Surveillance Report (1995). Also highlighted are the use of anti-acid medicines as this increases the risk of contracting the infection. A paper by Saeed and Harris (1992) explores these connections and found that direct contact with diarrhoeic animals during the week before the onset of human symptoms was a significant risk factor for the development of campylobacter. Infants are at greater risk than adults. Salfield and Pugh (1987) found the highest risk group to be the under five years age group. They also made a link with household pets, particularly puppies. Hopkins et al (1984) made an association with cats in the house. An explanation for this may be that intermittent shedding of organisms from the animals occurs, for example into carpets.

“Young children play and crawl on these surfaces. Their fingers and toys are frequently put to their mouths during crawling activity. Pets especially puppies lick faces and children do not discourage this practice.”
There is some evidence of person to person spread of campylobacter and also the condition is commonly acquired abroad, however in this latter case, trying to decide whether the cause of the illness is primarily zoonotic is as problematic when looking at cases from abroad as it is in this country.

Palmer and Gully et al (1983) clarify this last point to some extent as in their paper they make a link between an outbreak of infection and untreated water. In this case the water from a borehole, was stored in a tank, held in a bell tower which remained uncovered, and was therefore exposed to birds and bats plus their faecal droppings. The authors state that only a very small amount of organism is needed to constitute an infection risk; 500 organisms (Robinson 1981) are sufficient to result in an infection. The low dose required for infection, together with the finding that campylobacter are a ubiquitous contaminant of river water suggest water-borne infections are important. Further the washing of fruit vegetables and salads in infected water will present further hazards to health. Watercress grown in contaminated water is an important example. Quite commonly the run off of fertilisers, pesticides and faecal material from the fields enters the water courses, as does contamination from slurry spreading, dead livestock and birds.

Even when the food product is treated as in the case of pasturised milk a zoonotic transmission can occur, as was stated by Riordan and Humphrey (1992) when they examined, for their paper, an incident affecting eleven children at a day nursery who became ill and were diagnosed with campylobacter infection. It transpired that this had resulted from bird pecked milk bottle tops. Jackdaws, magpies and crows being the main culprits, with a greater time of risk in the spring. In this case the group of infected children from the day nursery could be linked with a particular day when the bottle tops had been damaged, this being within the putative incubation time, prior to the manifestation of symptoms.

When making comparisons with the age profiles of victims and incidences of three different enteric bacteria - E. coli 0157, salmonella and campylobacter a chart produced in the Canadian Integrated Surveillance Report 1995, p26, replicated here (Table 20) provides useful information. However these figures relate to incidences of a condition not zoonoses specifically.
6.3 CRYPTOSPORIDIOSIS

PHLS (1990) carried out a two-year study to investigate infective diarrhoea in England and Wales. They found that cryptosporidiosis, first reported in 1976, cited by Shield and Baumer (1990), in a child living on a farm, and caused by an intestinal parasitic protozoon, was the highest in children one to four years and that this pathogen was the second commonest after campylobacter. Of the cohort studied two hundred and fifty-three (22%) patients reported close contact with animals. The PHLS recommended that all diarrhoeal illness especially in children should be laboratory investigated and examination for cryptosporidium should take place. They felt a quarter of all cases may be directly zoonotic, the remainder due to person to person and waterborne infection.

Cases of this zoonosis cited by Barker (1998), go back to 1985 with a possible five cases within a family following a farm visit. In 1989 there were a further three cases aged between seven and eight years following a farm visit in the South West. A large outbreak in 1993 produced fifty-four cases in Berkshire resulting from one farm that held an open weekend. In the same year Bedfordshire had thirty-three cases connected with a farm visit and lambing. In 1994 a similar situation in East Anglia affected fifteen visitors. The worst situation occurred in the same year in Humberside with two hundred and eighty-eight cases after visits from nurseries, pre school playgroups and schools to a single farm, again connected to lambing. A rural farm in Pembrokeshire in 1995 became connected to thirty-three children and four teachers becoming ill and in the same year in the Republic of Ireland nine cases occurred. In this case there was a significant connection with children playing in a sandpit to which animals had access. It was located next to a stream and beside a picnic area; all major risk factors.

Spring and autumn peaks have been recognised for the incidence of cryptosporidiosis. This could be linked to lambing (Casemore 1989 and Barker 1998) and also patterns of farm activity such as slurry spreading. Dawson and Griffin (1995) follow this point with several examples of infection they
believe to be associated with farm visits. An early paper to support this was delivered by Casemore (1989), who conducted a study in Wales to formalise the link between humans and animals, for infection with cryptosporidium, and document it as a zoonosis. Factors highlighted in this study were trends for lambing indoors and near to farmhouses and bottle-feeding of weak and orphaned lambs, often housing them in the house at acute time of difficulty. It was noted that rural children were often invited to participate in feeding these lambs and the farm visit as an educational experience was taking place, frequently at this time of year. Thus urban children are involved with feeding as well. Cases derived from animals may therefore act as a source for urban transmission in person to person spread. Of the cohort studied the under five age group are most severely affected, 44% following contact with sheep and 40% with pets, especially kittens. Rural and semi rural incidence account for 60% of incidences in this study.

In 1989 three initial cases, plus a further eight, were linked to a dairy farm in Devon, this was linked to silage and cattle feed which the children had been asked to taste. In 1992, three separate incidents were reported all associated with a visit to a Derbyshire farm. In this case there were at least ten children who were symptomatic.

Miron and Keynes (1991) were anxious in the paper they provided to make the link with calves and an outbreak of cryptosporidium. Up to this point they felt that the transmission from animals to humans was posed but unproven as the human to human, faecal oral route had been the favoured route of transmission. Previous papers cited in this article had recognised that infection with cryptosporidium had been described in goats, pigs, poultry, calves and rodents, that cryptosporidium is not host specific and that transmission can shuttle between hosts of different species.

The opportunity to study an agricultural closed community in a Kibbutz was ideal as the community had it’s own milking herd of dairy cows at the time of the outbreak. In such communities children are mainly cared for by nursery workers, seeing their parents for only a limited time each day. An outbreak of diarrhoea occurred in the calves at the end of March 1988 and diarrhoeal type illness occurred in one farm worker shortly afterwards. This was followed ten days later by a case the children. The authors felt that a direct association of a zoonotic nature had occurred followed by person to person transmission within the community.

Pritchard and Fleetwood (1995) note that cryptosporidium survives sub-clinically in farm animals, particularly calves and lambs less than three or four weeks old, particularly if colostrum deprived. Even non-scouring animals can excrete the oocysts and act as a source of infection.
CHAPTER 7

VECTORS AND ZOONOSES

A vector is a carrier of a disease from a reservoir of disease to another but in this case the vector does not become infected in a manner to create illness in itself. The most common vector is the mosquito which transmits malaria. The recipient of the mosquito inoculation, as it sucks blood, is at risk of contracting malaria as a result but mosquitoes do not get malarial illness. Malaria is a zoonosis but it is not been relevant to consider it in this study however Borrelia burgdorferi is very similar in the manner in which it is transmitted. The common name for this condition is Lyme Disease.

7.1 LYME DISEASE \textit{Borrelia burgdorferi}

The causative agent of Lyme disease is \textit{Borrelia burgdorferi} which is a gram negative bacteria. Patwell (2001) offers some helpful background information to help in understanding the transmission of the bacteria. \textit{Borrelia burgdorferi}, the title of at least ten different species, gains entry to the host following the inoculation of the host resulting from a bite from a tick. For the bacteria to survive the host must supply be an ambient temperature plus glucose and lactic acid for nutrient.

Tick bite and the resultant Lyme disease are common in temperate zones especially in parts of the United States, Asia and Europe but also it does occur in the United Kingdom.

A tick transmits the infection to the host, usually about twenty-four hours after the bite, during the process of salivation in the feeding process. The tick becomes infected from a reservoir host, usually an animal, and then transports this infection during the feeding process to another host. Large animals such as deer, cattle, sheep, horses and birds are the main reservoir hosts.

The correct habitat is also important for tick survival, the requirements being humidity at the base of undergrowth such as deciduous woodland and dense vegetation combined with little air movement. Tick activity is greatest in the spring and early summer.

The initial illness caused is described as flu like after a distinctive rash has been observed which spreads from the site of the tick bite. The rash may be very faint and hardly noticeable. It is recommended that treatment with antibiotics is instituted although the condition does resolve without treatment. In some cases however this first stage of infection may progress to developments deleterious to health. If the organism spreads in the host the flu like state may be more severe with multiple areas of rash known as erythema migrans and more serious implications with nerve involvement particularly the facial nerve, possible meningitis, mild encephalitis, arthritis, joint swelling and possible carditis. A final stage may be reached by those patients inadequately treated which becomes a chronic arthritis affecting the knee joint, chronica atrophicans which is an unusual skin condition and very rarely meningoencephalitis.

Diagnosis of the condition depends on an accurate history as the tick will only be a risk factor to consider if the environment has been appropriate. It is therefore very important to establish correctly the activities pursued by the patient.

Infection can be prevented if the tick is removed promptly. This is easily achieved and the recommended action. Antibiotics are useful if tick removal is delayed. Vaccines are being developed but it is felt that the logical method of disrupting transmission is by controlling the environment where possible although this is only realistic on a small scale in areas such as parks, gardens and campsites. To attempt to modify all vegetation providing tick habitat would be too destructive to the environment.
To summarize tick bites can lead to more serious illness such as multiple organ failure with permanent neurological, cardiac and disabling arthritic conditions if they remain untreated, although such illness is fairly rare. In certain parts of the world Lyme disease is the most common tick related illness. It is possible to contract it in the UK but also it must be remembered that people travel widely for business and vacation purposes.

Literature relevant to the position of the United Kingdom (UK) and Europe and therefore to this study has not be found. However a project commenced in 1998 through 1999 in New Jersey investigating gastro intestinal disturbances seen in fifteen children aged eight to twenty who also presented with erythema migrans. The research attempted to make a link with Lyme disease and Crohn’s disease. The study found that patients with Lyme disease also present with chronic abdominal pain, blood present in the stool and acid reflux. Research to support this study has found that B burgdorferi can invade human fibroblasts and be protected from anti microbial action, surviving in the intracellular environment of the host. Researchers concluded that chronic inflammation can be associated with this bacteria. (Fried & Matthew et al 1999)

Bachman and Srivastava (1998) reviewed the clinical characteristics and diagnostic evaluation of Lyme disease in the USA and found it a particularly difficult condition to diagnose. They noted that in children the diagnosis of this condition was infrequent in the emergency room setting believing that under reporting is a significant problem. Davidson (1989) had reported similarly, that in children the erythema migrans rash may not occur and the bite goes unnoticed. He recommended that when seeing cases of suspected septic arthritis the possibility of Lyme disease should not be ignored. Gerber (1992) considered the seasonal risks for contracting this bacteria and also he charted what he believed to be an increasing incidence of the disease in the USA which he regards as highest in children. Reported cases in 1982 were one thousand rising in 1992 to thirteen thousand and in 1998 slightly over sixteen thousand. Children feature in these incidences with the greater number showing in the five to nine age range. Peterson and Sweeney (1989) also found the age range five to fourteen produced the highest risk group in a study in Connecticut where it is considered that Lyme disease is endemic. Carther (2001) provides a chart showing a known incidence of three thousand, seven hundred children aged 0-15 who were affected in the USA during 1999. It is not understood why children are the highest affected group but it is theorised that perhaps children complain more about the bite and that the vigilance of parents, when caring for the child, may aid detection of the bite (Peterson and Sweeney et al 1989). They also noted that complications of neurological, cardiac and arthritis type were more likely to be evident in those under twenty. Serology results do not become positive until three to six weeks after the onset of erythema migrans. A paper by Fedar and Hunt (1995), again centred in Connecticut, considered the situation of one hundred and forty-six paediatric patients. Their ages were two to twenty, mean age nine years. They found 2% (n2) of patients with tick bites had been misdiagnosed. A further 8%(n12) were found to have had a false positive diagnosis of Lyme disease. Those who did have the condition and were correctly diagnosed numbered 51%(n75), however 25% (n19) received inappropriate treatment. In this last group eighteen children were over treated and one under treated. The authors concluded that there was considerable error in diagnosis of this condition even in an area where the incidence is high and awareness should be acute. In 1992 the Lyme disease incidence in the USA was 3.9 per 100,000 population, the figures for Connecticut being much higher at 53.6 per 100,000.
CHAPTER 8

BLOWN IN THE WIND

Some zoonoses are moved from the locus of infection and cause disease elsewhere. A disease thus spread may be the cause of an outbreak of infection affecting many people but the transmission is not as a result of person to person contact. Although the illnesses caused are often mild and frequently not correctly diagnosed there can be effects on the body’s systems later in life. The connections between these events may be missed as there will be no record of the original causative agent.

8.1 Q FEVER OR RICKETTSIA Coxiella burnetti

This is a worldwide zoonosis caused by Coxiella burnetti a bacteria-like agent known as Rickettsia and presents in humans as a flu-like, febrile illness, usually self-limiting. On occasions a more serious picture may present such as abortion, endocarditis, pneumonia, hepatitis, skin eruptions and neurological findings. The most common reservoirs for Coxiella burnetti are cattle, sheep and goats who are endemic in infected usually without ill health (Smith and Ayres et al 1993). The bacterium is found in urine, faeces, milk and birth products of infected animals. In addition the spores are found in fomites such as wool and straw and are able to survive for long periods in hot and dry conditions. Human infection occurs as a result of inhaling infected aerosols or by ingestion of raw milk or fresh goats cheese, an ideal medium for the transmission of the infection. Rabbits, wild and domestic, plus other pets such as dogs and cats can also transmit infection to people.

The true incidence of this disease is unknown as under diagnosis is a major factor. It is claimed that this is a disease that follows researchers as this is when factual information is disseminated as a result of research interest and subsequent raised awareness. Blood donors demonstrate high antibody counts to this infection indicating that they have had an occurrence and probably remain unaware of it. It also recognised that the bacteria can be spread human to human through blood transfusions and bone marrow donation (Biological Warfare Defence Information Sheet). Tissot-Dupont and Torres et al (1999) suggest that in Marseille at least two thousand people would be infected per year. In many countries Q fever is not reportable and therefore statistical evidence is hard to achieve.

The Tissot-Dupont study from a large rural area in France in 1999 aimed to prove a link with large numbers of sheep grazing and infection in a windward direction of the flock as there is evidence to suggest that the aerosols are spread on the wind. This paper reported that there was no correlation with Q fever outbreaks and sheep density. Rather the correlation lay with Q fever and sheep density, downwind of the outbreak. The wind was termed the Mistral known to be a hot dry wind which funnels down from the Alps through valleys to the coast in France.

Five cases of clinical Q fever were identified from a school in Somerset in 1987 affecting students and staff. Goats were kept at the school and implicated as a result of helping with kidding or cleaning out. A study was commenced at the school in which four hundred and ninety-eight subjects participated. Eighty-seven subjects had antibodies to the infection and Jorm and Lightfoot et al (1990) admitted that many individuals had antibodies for which no contact could be ascertained. They concluded that there was considerable under diagnosis of this disease with only one in thirty individuals being accurately diagnosed with the disease in its active state. Recovery is frequently spontaneous and uneventful although pneumonia is serious for some as a complication. The most serious aspect of under diagnosis in this disease is the consequences in later life as mentioned later by Smith and Ayres et al (1993).
Smith and Ayres et al (1993) report on their study of an outbreak in an urban area in England. In this study they reported on one child aged eight affected, but believed this to be unusual. The outbreak occurred in 1989 in the spring in the West Midlands, predominantly an industrial area. The diagnosis was confirmed in one hundred and forty-seven people, mainly males of working age one of whom was a farm worker. The conclusion was reached that the infection had spread from the farming area to the south of the community affected. An unusually large number of patients presented at their doctor or hospital services with pneumonia type illness thus stimulating the enquiry. Q fever was not suspected until the more normal causes of pneumonia had been excluded. Following this discovery blood samples taken previously on all patients in the area diagnosed with pneumonia were tested for Q fever. Supportive studies using interview and case control methods were instituted to give credibility to the study.

Hospitalisation occurred in sixty-two of the one hundred and forty-seven patients surveyed. Of these, two cases of endocarditis, two cases requiring haemodialysis, three patients had neurological symptoms including epilepsy, migraine and personality change demonstrated the more serious consequences of this infection. Due to the spontaneous recovery in many people who sero­converted in this outbreak, with little sign of ill health at the time, the authors feel there may be a significant increase in the future, of people presenting with chronic complications in later life, in this area.

The authors mentioned here agree with the French study that the organisms are wind-borne from infected fomites. This means that the risks are not restricted to farms or necessarily farming areas of the countryside, but will locate where the prevailing wind takes them.

8.2 HYSTOPLASMOSIS Histoplasma capsulatum

The following information relies on material from the USA as no papers for the UK have been found.

This is a fungal disease caused by Histoplasma capsulatum which primarily affects the lungs. Occasionally it may be disseminated to other organs and can be fatal if wide spread. In the USA, where the fungus is common, as many as 80% of the residents of a selected area test positive to histoplasmin on skin test. Infants, young children and those with chronic lung conditions are more at risk. The fungus grows in soil contaminated with bird and bat droppings. Spores become air­borne when the soil is disturbed. Problematic areas are poultry houses, caves and bird roosts.

The illness presents with a mild respiratory and flu like illness resolving spontaneously. In more severe manifestations anti-fungal treatments are available. Past infection confers a degree of immunity (Center for Disease Control USA 2001).
CHAPTER 9

SKIN INFECTIONS

Those handling animals or touching materials in the animal environment are exposed to risk of contracting skin conditions as discussed below.

9.1 ORF *ecthyma contagiosum*

This is a common condition and one readily recognised in farming communities, transmitted from sheep, usually at lambing time. It is also seen in goats in a similar way. (Moore 1973, cited by Paiba and Thomas 1999). Two seasonal peaks have been noted in the UK, the larger of these is the spring to early summer. The second and small peak is in the autumn, noticeable among abattoir workers. Butchers, abattoir workers and those in the catering industry have been found to be at risk of infection resulting from contact with infected carcasses. The infection was first recognised approximately two hundred years ago but recorded in humans about thirty years ago. (Peterkin 1937, cited by Buchan 1996). The infection called orf, caused by the parapox virus, affects the muzzle of young lambs and the udders of the ewes. The virus is extremely stable and can survive on fomites for long periods of time. Farmers report that it is more common in flocks where pastures are affected by gorse, thistles and other thorny plants. It is thought the tender flesh on the muzzle of the young lamb is inoculated by the plant holding the virus, and thus the affliction is spread amongst the flock.

The true incidence of orf affecting the human is not clear (Piaba and Thomas 1999) but shepherds, their wives and families accept that it is something they may get, especially if involved with bottle-feeding lambs who are sickly. Buchan (1995) found in a survey conducted in Mid Wales that 25% of those working with sheep in the 16-65 years age group had been infected with orf at some time. Human to human spread of orf is very rare, Buchan found only three reported cases. This is quite surprising as the orf pustule is full of viral particles. The pustules are mainly found on the hands of those infected although spread may occur on the victim from hands to face. The lesions usually heal without scarring unless there has been secondary infection which might be more problematic. Some immunity may be conferred by an infective episode but not always. Several of Buchan's patients had received more than one attack.

Diagnosis is by examination of the clinical findings with confirmation by electron microscopy of cells from the crust or biopsy. Antibody response is not considered reliable and viral culture is slow. Resolution takes approximately six to eight weeks and there is little treatment to offer except for antimicrobial treatment for any secondary infections. Unfortunately the length of time this takes can promote real difficulties for work and economics in the farming enterprise. Immuno-compromised patients may be more severely affected

Buchan reported the finding of his study into the incidence and nature of orf infection in 1996. He found that teenagers had the greater number at 29% (n21) from a cohort of two hundred and fifteen respondents. His report was not more age specific than this.

Paiba and Thomas (1999) report on their study which looked at groups of farmers recruited for a prospective study across three areas of England. They had a total of six hundred and six farmers of varying ages. The study areas were Hereford, Preston and Norwich. They found that contact with dogs, cats, ducks and rats were variables requiring further investigation. Also handling hay, silage, straw and the drinking of raw cow and goat milk produced interesting data. The discovery of one
naturally occurring incident with a dog from the hunt kennels was significant. The dog was found to have the condition and the link was made with the eating of whole unskinned sheep carcasses which after death were disposed of in this way before the bovine spongiform encephalopathy (BSE) crisis by farmers, who provided the kennels with animal food. The association with the other animal species was not expanded upon. Piaba and Thomas found 15% of farmers claiming to have the condition, considerably less than the Buchan findings. They attributed this to the fact that the Buchan study had been in a sheep farming area, whereas their study had the findings diluted by mixed farming and arable predominance in the areas they examined. Concern was also raised that the numbers for the study emanated from self-diagnosis and the Buchan study had referred to diagnosis supported by general practice.

9.2 RINGWORM *Trichophyton verrucosum*

Ringworm is attributed to a fungal infection with *Trichophyton verrucosum*. Maslen (2000) noted in a paper examining the situation in Victoria, Australia that it was first recorded in this area in 1952. *Trichophyton verrucosum* is a cosmopolitan zoophilic dermatophyte fungus. Maslen informs us that as man and his domestic animals migrated throughout the world some of the zoophilic species accompanied him. This particular one producing ringworm is common in temperate regions of the world. Infected cattle are the normal hosts but domestic animals can also be infected and transmit the infection to others. The infection is transmitted by contact of healthy animals with infected animals or their housing, this includes walls, gates, woodwork and milking parlours. Abattoir workers are also at risk from infected hides. The infection is readily transferred animal to animal or human to human via contact with the fungus. The lesions are inflammatory and can occur anywhere on the skin or scalp.

It is evident that ringworm is more prevalent in areas of the world where the housing of animals for climatic reasons is necessary. There are deemed to be less areas contributing to the spread of this fungus where stock are out to pasture. Another area of quite high risk is milking parlours where animals are bought frequently into housing and at liberty to rub against fixtures later contacted by other cattle, animals such as the farm dog or humans. Isolates in the human species have included those of either sex and any age group, including children. Quite commonly those infected are connected with farming and the agricultural environment. Slaughter persons and even a veterinary tutor have been included as examples.

9.3 SCABIES *Sarcoptes scabiei*

Scabies is a contagious disease of humans and other mammals caused by the mite *Sarcoptes scabiei* which burrows into the dead layer of the human skin. Scabies is transmitted from person to person with sporadic outbreaks occurring in communities such as nursing homes, nurseries, schools and other institutions. It is also epizootic in wild and domestic animal populations.

There is some debate about the host specificity of *Sarcoptes scabiei*. Other mammals known to be infested include dogs, cats, rabbits, cattle, pigs and horses and the condition is referred to a mange in the animal species. *Sarcoptes scabiei* is now considered to be one species. Populations found on different host species differ physiologically more than morphologically and are referred to as forms, the human version being *S. scabiei hominis*. It is considered that mites from one species do not establish themselves on another species. Humans have been infested from horses and dogs but infestations are mild and should disappear spontaneously.

"Indeed the animal scabies infections of humans behave completely differently" (Bell Palmer and Payne)
A recent study by Walton and Choy et al (1999) has shown that two morphologically identical varieties of Sarcoptes scabiei (var. hominis and var. canis) belong to different genetic groups, their DNA profiles clustering by species rather than geographical origin. The study by Bennett (2000) found few patients seen by consultants reported contact with infected animals (22 cases estimated by 8 out of 97 consultants in 1998). Therefore although scabies was a condition included in the questionnaire for this study it would appear unlikely that any cases, as a zoonosis will be seen.
CHAPTER 10

A number of zoonoses can be imported into this country from abroad. Psittacosis is one of these diseases, although not categorically an imported disease this is often an implication as it affects more commonly exotic species of birds. The disease appears manifest after a period of stress, possibly due to changed environment or unsatisfactory housing. Such exotic species are more common as pets today and many farms have an interest in rare breeds which may involve importation.

10.1 PSITTACOSIS Chlamydia psittaci

Chlamydiosis is a zoonotic disease caused by Chlamydia psittaci. The bacterium has been isolated from one hundred and twenty-nine avian psittacine species for example parakeets, parrots, macaws and cockatiels. In non-psittercine caged species infection frequently occurs in pigeons, doves and mynah birds.

The incubation period in birds is low at 3-10 days, however latent infections can occur and active infections can occur years after exposure. Stressful conditions for the birds such as shipping and crowding appear to contribute to the condition. The organism is excreted in the faeces and nasal discharges of the infected birds. It is resistant to drying and can remain infective to other hosts for a period of months. From 1982-1991, 1,344 human cases of chlamydiosis, with six deaths were reported to the Centres for Disease Control and Prevention. Caged birds accounted for 70% of the exposures in the human cases. The largest single group of people for whom contact could be established for this infection were pigeon fanciers, poultry processing workers, veterinarians, laboratory workers, farmers, zoo workers, construction and demolition workers, all people exposed to the bird droppings. Human infection usually occurs through the inhalation of the organism as an aerosol from the urine, respiratory secretions and the faeces. Incubations in humans is five to fifteen days and manifestations range from mild flu like to severe pneumonia. Treatment with anti-microbial agents is usually effective. Mortality is rare, however because the strains are distinct therefore limiting the immunity provide to only one strain re infection may occur. Additional conditions such as myocarditis, hepatitis, arthritis and encephalitis may result from infection. (Flammer, 1995) No data for the UK is apparent for this disease.

Chlamidia psittaci is also responsible for enzootic abortion in sheep (EAE). Sheep become infected by inhaling the organism which causes abortion and the birth products are infectious for several days allowing the organisms to be spread on the wind. The organism can also survive on pasture for several days in cold weather and vermin are capable of picking up, ingesting and transmitting the organism to neighbouring farm. The main risk to human health is that affecting pregnant women who if pregnant or attempting to become pregnant should not be in contact with sheep, clothing and equipment connected to shepherding or lambing or new-born lambs of any sort.
CHAPTER 11

EXCRETION

There are a number of zoonotic diseases that can be contracted after contact with the excrement of other animals either directly or due to its concealment in the soil or other fomite. Although gastrointestinal disease as discussed earlier follow a contact either directly or indirectly with faecal excrement the following diseases cause different types of illness in the victim.

11.1 HYDATIDOSIS / ECHINOCOCCOSIS *Echinococcus granulosus*

Echinococcosis is a zoonotic parasitic disease caused by the dog tapeworm. The hydatid cyst is created when the worm reaches the larval stage. Echinococcosis is a cyclozoanosis that requires two vertebrate hosts to uphold the life cycle. Important to the cycle as intermediate hosts are sheep and the sheep dog but also foxes as they feed on sheep carcasses (Walters 1978). Humans can accidentally become intermediate hosts, along with a wide variety of other animal species, by ingesting the eggs of the tapeworm. Cysts if they result usually develop in the liver and lungs.

The changing incidence of human hydatid disease has been examined by research. Palmer and Biffen (1987) made comparisons between England and Wales using their own findings and those of others to firmly establish the link between high density sheep farming and the disease prevalence. They found that over the period since 1953 the incidence was declining, but that this was not the case in those under fifteen years in Wales (Table 21). Major initiatives have taken place in Wales since that time with education programmes in the schools re the causative factors for this disease.

Table 21

Incidence/100,000 per year of hospital-diagnosed human hydatid disease by age.

<table>
<thead>
<tr>
<th>Age Range Yrs.</th>
<th>Wales 1953-62 cases</th>
<th>Wales 1974-83 cases</th>
<th>England 1953-72 cases</th>
<th>England 1974-83 cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>0.1 (2)</td>
<td>0.3 (3)</td>
<td>1.1 (1)</td>
<td>4.1 (30)</td>
</tr>
<tr>
<td>5-14</td>
<td>0.3 (12)</td>
<td>0.4 (15)</td>
<td>2.2 (4)</td>
<td>4.4 (7)</td>
</tr>
<tr>
<td>15-29</td>
<td>0.6 (29)</td>
<td>0.3 (20)</td>
<td>5.1 (11)</td>
<td>4.9 (11)</td>
</tr>
</tbody>
</table>

Based on 1961 and 1981 Census population figures

( Palmer and Biffen 1987, p698)

During the study 1983-94 two children from Gwent and Mid Glamorgan were found to be infected out of the total Wales figure of 62 cases, which was higher than previously found (Palmer, Biffen and Walters 1996). The English total figure for this period had declined to 43 cases, Herefordshire being noted as a hot spot. Under reporting is a major factor in quantifying these disease cases especially in England were the coding of cases is thought unreliable.

Some countries are attempting to eradicate the disease and this has been matched by a dramatic decrease in incidence although there remains evidence that in large parts of the world the disease is increasing due to lack of meat control and dog management. This is especially important when dogs are used in the management of other animal species such as sheep. Dog faeces may contaminate
sheep pasture and thus increase the risk of sheep becoming a host for the eggs. It is also thought that flies and other insects may mechanically transport the eggs over a wide area. It is very important for the eradication of this condition that dogs are treated with anthelmintics specific for tapeworm every six weeks and that feeding of raw meat and offal to dogs is discouraged. Meat for human consumption must be thoroughly cooked. Sheep are normally regularly dosed for round worms only.

Once eggs are ingested it is the immune system of the host which dictates whether a hydatid cyst will develop and thrive. The hydatid cysts are well tolerated by humans until they increase in size sufficiently to create pressure on other organs. The cyst may also burst into the peritoneal or thoracic cavity, which can give rise to anaphylactic shock or give rise to many new cysts. In the intermediate host diagnosis of the hydatid cyst is possible with ultra sound scanning and radiology. Anthelmintic drugs are available to treat the worm thereby preventing segmentation release, with eggs attached to the end segment of the worm. This is the portion leaving the intermediate host in their faeces. Should a cyst occur, removal surgically is the preferred method of eradicating the problem. (Permin and Hansen 2001)

Lopez-Rios and Perez-Barrios (1997) describe the case of a primary intra-cardiac hydatid cyst in a child of four years. This case stimulated special interest due to the young age of the patient and the situation of the cyst. The more common location is in the liver, found in 60% of cases and the lung found in 20% of cases. An intra-cardiac cyst is very rare in a patient of any age. Ottino and Villani et al (1987) suggest only 0.5-3% of cases.

Schistosomes are another variety of worms more commonly located in tropical areas. They also cause disease in humans and animals in many parts of the tropics and sub-tropics. They have a complex life cycle involving humans and snail hosts (Hagan 2001), living and feeding in human blood in the capillaries of the intestine and bladder. When the eggs become embedded in the tissues they stimulate an immune response, producing a severe inflammation which can ultimately lead to disease and death.

There are effective drug treatments for this disease, but owing to the cultural nature of behaviour amongst those who get infected by the use of contaminated water for bathing and other purposes, re-infection commonly occurs. There is concern about whether these worms will develop a resistance to the medication over time. Children are especially at risk. The provision of safe drinking water and education regarding the use of river water is one way of helping people avoid this disease. However more concentrated efforts at controlling the snail population are advocated but this has environmental risks. A greater understanding of the way schistosomes survive in the mammalian hosts is needed. Exploitation of this knowledge to control the disease may be the way forward.

It is very unlikely that this study will be able to report on this condition in the data collection however it is described here at a suitable reminder that with the development of extensive travel to exotic venues undertaken by people for work and leisure such geographically specific conditions must be remembered.

Several Toxocaral roundworm parasites of domestic animals can infect humans, usually in the larval stage. The clinical condition is called larva migrans and cutaneous, ocula and visceral describe the sites which are commonly involved in that migration. Dogs and cats are the most common domestic animal implicated in this zoonosis. A major reservoir for T. Canis is puppies of less than ten weeks of age as nearly all have them at birth as a result of transplacental larval transmission. Thousands of eggs are released into the soil at defecation. A study in the USA suggested that 2-10% of children are infected, increasingly noticeable in low socio economic groups, rural residents and under eleven years of age children (Herman and Glickman et al 1985). Once eggs are deposited in the soil they can
survive for many years despite extremes of weather and they are resistant to modern sewage processing (Black and Scarpino et al 1982).

Taylor and Keene et al (1987) describe fourteen children in Scotland and Ireland who had high toxocara antibody titers. They were investigated following complaining of abdominal pain, cough and headache with hepatomegaly. Glickman and Magnacal (1993) refer to a six year old and a five year old both with ocular disease, also an eighteen month old child who had convulsions and other symptoms. In this last case the diagnosis was not achieved until autopsy when disease was discovered in the lungs, liver, heart and brain. This baby was known to be a soil eater.

A typical patient presents between two and seven years, usually has had contact with pets and may well eat soil. However it is vital that dogs and cats are treated regularly with anthelmintics and that the distribution of their faeces is curtailed. Education is vitally important so that people are aware of the risks, recognise possible symptoms, and get early treatment, so that the devastating effects of long-term disease can be avoided.

11.2 TOXOPLASMOsis *Toxoplasma gondii*

Toxoplasma gondii is found throughout the world and is a single celled parasite. In the USA about sixty million people are thought to have become infected at some time but few have symptoms because their immune system prevents the parasite from causing harm. It is for this reason that this zoonosis was not included on the questionnaire as it is not likely to come to the attention of the family doctor as a case in children.

Infection with toxoplasmosis occurs after a hand to mouth incident following contact with cat faeces either from a litter tray, the soil or contaminated surface. Another way of receiving infection is through undercooked meats. The female immune status can be established by a simple blood tests and for those with a negative status, vaccination may be possible. If a positive status is found then there are minimal risks unless immuno-compromised.

The major risk is to the foetus in pregnancy for those who have not achieved an immune status either by having the infection or the vaccination. The greatest risk is for those first exposed to toxoplasma within the few months before commencement of the pregnancy and during it. For this group great care must be taken when in contact with cats, kittens, litter trays, the soil and raw meats.

Precautions such as wearing gloves for gardening, litter tray cleaning, plus meat handling are recommendations made in the literature. Leaving the job to someone who is not pregnant is an option. Great attention to hand washing with soap and nailbrush is very important.

11.3 LEPTOSPIROSIS *Leptospira icterohaemorrhagiae* and *leptospira hardjo*

Leptospires are a group of bacteria, causing leptospirosis. Sometimes known as Weils disease it is known to affect sewage workers in times when they had to walk in main sewers that were rat infested. The bacteria can enter the body through abraded skin, the mouth or eyes and pass out in the urine. If the bacteria are passed onto damp soil or into water they can survive for some time, providing opportunity to pass into another animal or human. They like warm wet conditions and so favour climates that have these, however they also survive in the more temperate climates.

Anyone who comes into contact with contaminated soil, water, infected urine, and that which has become contaminated with the same, is at risk. Adults are usually more at risk than children due to their work environments especially if they work with cattle, sheep or market gardening. Leptospirosis can be caught from swimming in contaminated pools and rivers, from picnicing,
walking barefoot, or in open sandals on wet grass.

Animals are important for the transmission of this disease especially rats because they can harbour the bacteria in their urine for a long time. Further, once infected the rat is a carrier for life, Webster and Ellis et al (1995). Anywhere that is rat infested is at greater risk and this includes animal housing for cattle and sheep. These animals then become infected and are capable of spreading the infection. Similarly the domestic dog is considered high risk, and the cat, but less so. These pets are extremely hazardous to man due to their close proximity to man in his surroundings. Babies and children who play on the ground are at considerable risk. Animals can shed bacteria even when vaccinated although not appearing unwell and therefore they still pose a risk to human health. All urine, even that of the human, should be regarded as infectious. Periods of heavy rainfall, causing flooding, watercourses and drains to overflow should be regarded as a serious threat to health. Every attempt must be made to control rat populations. Vegetables and salads eaten raw must be washed thoroughly.

The illness may be flu like and recovery can be spontaneous, but occasionally a more severe manifestation occurs, with jaundice and kidney failure, requiring urgent medical attention. Diagnosis can only be made with serology testing which must be robust. The above information refers to work headed by Everard (1995), over a twelve year period in Barbados, in association with the Medical Research Council in the UK. The data resulting is considered accurate and comprehensive due to the length of the study. The current incidence is approximately 12/100,000 per annum (31 cases per year). Other Caribbean islands have different incidence figures.

In the UK, for the year 1994, there were only fifteen proven cases in humans in the UK (Webster and Ellis 1995). Only 14% of the rats studied at this time carried this disease, considerably less than the expected 50 – 70%.

L. hardji is also important on farms as cows may be subclinically infected and excrete the organism in their urine. Splashing of workers in the milking parlour may allow the introduction of potential infectious material particularly through mucous membranes or abrasions. Due to the location of cows in this case it is unlikely that children will be in close proximity however this is an area of risk. It is possible to vaccinate cattle. The disease is notifiable in humans but not in cattle so the amount of infection may be unknown.

Hantavirus as mentioned by Coleman (2000) in the introduction is an example of a flu like illnesses which can be confused with leptospirosis. Other diseases which should be differentiated from leptospirosis are pseudomonas, cryptospirosis, listeria, borrelia burgdorferi, salmonella, rickettsia, sarcocystis, cowpox and toxoplasmosis as the treatment and outcomes may differ. Webster and Ellis et al (1995) suggest some of these conditions can affect animals, having a further impact on human health. The authors found that rat prevalence and hence disease was becoming an urban problem more than a rural one, contrary to Coleman (2000) who found leptospirosis a problem among farmers.

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CHAPTER 12

Tuberculosis is often considered a social disease as it is fostered by poor social conditions and poor nutrition. Vaccination and prosperity hugely reduced the incidence of this disease however in recent years once again the incidence of diagnosed disease is increasing. Part of the cause for this is increased travel, migration from countries where the disease is endemic and a reduced vaccination policy in this country. The introduction of tuberculin tested herds for the production of milk offers great protection to humans who consume the product, and for this reason tuberculosis qualifying as a zoonosis was vastly reduced. Further protection was achieved with the pasteurisation of milk before consumption. It is very unlikely that the disease can be contracted from cows’ milk in this country and therefore the bovine connection is unlikely but not impossible for tuberculosis.

12.1 TUBERCULOSIS Mycobacterium avian and bovis AS A ZOONOSES

There are three types of tuberculosis (TB), bovine, avian, and mycobacterium tuberculosis. For it to be considered a zoonosis it must originate from either bovine or avian strains. Veterinary services are quick to inform agricultural workers that this disease has not gone away. Considerable efforts must continue to maintain the negative status of bovine animals.

Bovine TB is a contagious disease affecting both animals and humans and it can be transmitted either way between the two species. It cannot tolerate prolonged exposure to heat, direct sunlight, or dry conditions. Under cold, moist conditions it thrives. The disease has been discovered in petrified bones found from 8000BC. It can be spread from airborne infection as easily as by drinking infected milk.

The presence of the disease in cattle and therefore in humans has decreased massively due to the protection of herds and the pasteurisation of milk. All herds in the western world are tuberculin skin tested at ten to fourteen month intervals to check their negative status. The whole herd must remain negative. It then qualifies for “Accredited Herd Status”. The program has resulted in a reduction from 0.5% to 0.02% infectivity in herds and as a consequence the human TB from bovine infection as reduced dramatically. This may not be the case throughout the world and travel is again implicated as a risk factor. In the USA some herds are so large circa 3,000-10,000 cattle that whole herd slaughter is not possible due to compensation costs. The effect of the slaughter programme was greater when herds remained small. In the USA wild deer and elk have presented a threat to the bovine animal as they are known to be infected with TB, with a known capability to transmit it to cattle. In the UK badgers have presented a similar threat as they are known to have endemic TB and the badger population, a protected species, is known to be increasing.

Dr G Adams (1996) Texas, USA reports that calve imports from Mexico particularly Holstein have accounted for cases discovered in the USA in recent years and this highlights the problem of introducing imports to the herd. He also points out that as the occurrence of TB is rare there is reduced awareness amongst new veterinary graduates. He urges that control and vigilance is maintained or the organism will return. With the increasing emergence of TB Mycobacterium in humans from person to person contact there is a possibility of cattle receiving the infection via this route. Slaughter men must be vigilant when examining carcasses for lesions. It is also mentioned that there is no effective vaccine for cattle. The 1996 European Report on the Epidemiology of Zoonoses noted a case of tuberculosis Micobacteria bovis in a five year old child in Scotland.

Avian TB is more host specific and it is normally confined to birds. The destruction caused by TB to the host is from the host’s own immune reaction to the pathogens rather than the bacterium itself.
CHAPTER 13

PROBLEMS ASSOCIATED WITH DATA COLLECTION

This literature review has relied heavily on material from the USA and there has been considerable difficulty in obtaining papers stating the case in the UK and Europe regarding many of the conditions reviewed. The problems of differentiating accurately the source of the infection as a zoonosis has been observed, as has the cost of undertaking epidemiological studies when it is perceived that the actual number of cases is small, but nevertheless significant, for those few who are seriously affected by disease. Many of these diseases are reportable to public health departments, however this is only mandatory when the illness is considered to be caused by ‘food poisoning’, there is no requirement to report the disease in animals, or the isolates of organisms from animals (European Trends 1996). Exceptions to this apply in the UK and as related to this study include tuberculosis due to Mycobacterium bovis and leptospirosis when mandatory reporting of the appearance of disease in the animal is required.

A representative from the Public Health Laboratory Service (PHLS) commented in a telephone interview that diagnosis, and epidemiological studies, of gastrointestinal infections, are inhibited by issues of confidentiality.

“Laboratory testing revealing proven cases has only name, age and sex. No postal code or address is supplied making data collection hard”.

The position of farmers, as asymptomatic or less severely ill, thus getting better without seeking general practitioner advice, is endorsed by PHLS. This confirms the view that these individuals can pose a threat as carriers of the disease to others. The interviewee also confirmed that the risk of VTEC 0157 is posed by all ruminants on a farm, by their excrement and any person or animal in contact with the same.

The data to be collected for this study will rely on general practitioners for the completion of a questionnaire document. A study by Elliott (2001) employed structured interviews with general practitioners to ascertain their knowledge of zoonotic diseases. She found disappointing levels of knowledge, and answers which revealed a limited list of the diseases having a zoonotic component which could affect their patients, according to general practitioner awareness.

The degree of knowledge and understanding varies between the professionals involved in diagnosing, monitoring and researching zoonoses. Each of the different groups which would include veterinarians, general practitioners, nurses and public health workers have different contributions to make to the study of zoonoses and increased collaborative working between all concerned would offer a valuable opportunity for strategy development in prevention and control of this group of diseases (Hennemann et al 1995). Such collaboration and the cascading of information to those working in the field would be an important contribution to maintaining healthy communities.
CHAPTER 14

RECOMMENDATIONS

As described in section one of this report the majority of the recommendations require that individuals change their behaviour. The group of people includes the individual likely to be made ill and also those in the wider environment. For effective behavioural change those involved need information and guidance. Many people may be ill as a result of zoonotic infection. They will not be quantified and they recover spontaneously in the majority of cases. The long-term outlook for a few may be more serious but the connection to a zoonotic episode may never be formulated. There are a few cases either individual or as small outbreaks which have catastrophic consequences and immense importance is attached to remedying the underlying causes. Prevention is simple if a level of awareness at national, regional and local level regarding zoonoses is achieved. In particular attention should be given to the main sources of gastro intestinal infection which affect children especially when visiting farms or handling animals. Further the potential for people to transmit infection to other household contacts needs to be publicised. Of all of the infections discussed it is e coli 0157 that has the most devastating consequences for a few victims. Many other diseases cause significant morbidity and occasionally mortality.

14.1 AWARENESS AND ACTION

Gastro intestinal infection can be reduced and in many cases prevented by effective personal hygiene. This applies to zoonoses apart from those conditions spread by consuming the flesh of the infected animal. The expedient of thorough hand washing using individual containers of hot water, soap and a nail brush followed by effective hot air drying or individual towels, will considerably aid the prevention of primary zoonotic illness occurring through contact with animal or fomite. Care should be taken when picnicing or consuming food on land contaminated with excrement. The personal hygiene recommendations applied to all persons at times of food preparation, toilet usage and the caring for or feeding of children or other vulnerable people who require care would greatly reduce the secondary transmission from those who have inadvertently become carriers of disease. The remedy is not costly or sophisticated but it is subject to human error. The HSE do make these recommendations to all persons who organise trips to farms and to the countryside and leaflets are published for this purpose.

If people cannot be relied upon to exercise judgement regarding personal hygiene behaviours, and as many of the individuals are children this can be difficult, the way forward may be to remove as far as possible the diseases from the animals gut. The blocking of transmission pathways is one avenue being explored by scientists (O’Brien, 2000). Noteworthy is the fact that VTEC 0157 can survive in an acid environment even that found in apple juice but not in environments which combine acid and alcohol, (Adak 2001). This may be one of a range of important considerations in stock feeding and silage production. Recommendations indicating the use of acid and ethanol treatments for the suppression of bacteria in the ruminant gut, are one suggestion, plus the addition of probiotic bacteria to feed (MAFF, OZ0702). Syne and Gunn (2000) commented on the survival of the bacteria in home grown barley feed. They also noticed that a herd of cattle maintained from home born calves had a significantly lower incidence, found in the cattle of E. coli, than herds with high levels of bought in replacements. The significant risk posed by the survival of the bacteria in soil, manure and silage suggests experts should consider the safety of slurry and muck spreading on the land. Such land is then used for picnics and camping activities associated with the consumption of food. The treatment and disposal of animal faeces is a problem being considered by the National Zoonoses Group, London (2001). Further studies examining plant antibodies as an inoculation for cattle (Maff, Z0703), and inhibited virulence gene therapy, (BBSRC/SERAD, BFP11349) cited in the 2000 report of the Microbiological Safety of Food Funders Group (MSFFG) may provide
innovations for altered production methods in the future. In the mean time there is published advice (HSE) for those offering their premises for use by the public suggesting, measures which may be taken to improve the environment.

There must be clear instructions which can be adapted to the needs of the target groups so that they can read and understand it i.e. children. Advice should be given about eating in only designated areas and behaviours such as thumb sucking must be discouraged. David Mattey Health and Safety Executive Chief Agricultural Inspector (1998) said- 

“Although the majority of the 10 million visits to farms each year are enjoyable experiences, there is a small risk that visitors can become ill following contact with animals. All animals carry a range of bacteria and other microorganisms. Straightforward hygiene measures such as thorough washing of hands after contacting animals will greatly reduce the risk of infection”.

There are incidences of food borne zoonotic disease. Where food has become contaminated by disease in the animal prior to it being cooked and eaten. Poultry is a major problem and this would include their eggs, also beef products which due to processing have allowed the exterior flesh of the animal to become the interior of the product as in the case of beef burgers. In all cases the disease is effectively killed by cooking the product completely through to a high enough temperature. Some modern cooking techniques such as the use of microwave ovens and barbecues have meant that this is not always achieved. Prevention of transmission at source would greatly facilitate prevention of this category of disease.

Monitoring of animal health is already employed for the eradication of tuberculosis in dairy cattle, leprospirosis in herds and also brucellosis. The drinking of untreated milk is not recommended. The consumption of unpasturised cheese is a hazard and certain vulnerable members of society are urged not to consume it.

Diseases transmitted by contact with the soil can be effectively prevented by regular dosing of the animals with anthelmintics, thus reducing soil contamination by the infected animal excrement. The individual has a responsibility to protect themselves by effective hygiene measures. It is also important to wear gloves when gardening. Pets are a source of infection and should not be allowed to get on bedding, lick young children, especially around the face and hands, or be handled during food preparation or consumption. Young children should not be allowed to crawl on surfaces contaminated with soil and their toys should be protected. Great care should be taken with the management of cat litter trays. It also worth remembering that when cats have finished scratching about in the soil or litter tray their paws are contaminated and capable pf spreading infection to other areas. The foetus is at risk from some diseases spread this way.

Cold blooded pets such as tropical fish and reptiles are a major hazard for the spread of salmonellosis and the PHLS in the UK and the CDC in the USA have made recommendations that pregnant women, small children and those immuno incompetent should avoid contact with these species. More information in the public domain is needed to inform purchasers and vendors about the risks posed and the care needed to manage this group of pets safely. Personal hygiene must be effectively managed to prevent the spread of this serious infection among humans.

Water for human consumption should always be from a source providing treatment to achieve a safe product. Private water supplies should be tested, and wells must be protected from contamination by animals, birds or insects.

Packaging should remain intact or the food or drink safely produced may become contaminated before it is consumed as in the example of bird pecked milk bottle tops.
SECTION SUMMARY

PROBLEMS

- Lack of clarity in proven incidence data.
- Lack of awareness amongst the public that there are risks, associated with animals and their habitat, invisible but real.
- Some animals excrete pathogenic bacteria yet are not ill therefore remain unidentified.
- Natural environments will always be reservoirs of infection.
- How to educate people regarding the risks in an acceptable and innovative manner.
- Opening the countryside to greater numbers of people safely
- The identification and provision of safety measures.
- Inadequate information and advice about the implications for some choices of pets.

REMEDIES

- Clearly identify the size of the problem with collected data both standardised and comparable.
- Educate farming families about the risks of infection from the environment where they work and live.
- Attempt to eradicate pathogenic disease from herds and their environment.
- Work with veterinarians and public health agencies to develop procedures and protocols to safeguard the health of the public at large.
- Develop infection control policies to advise farmers, their families and visitors how to employ hygiene measures effectively.
- Regulate the availability of some unsuitable choices of pets and attach a health warning to those that are sold.
- Work with organisers of visits to explain the risks and the remedies for effective hazard identification and management.
- WASH YOUR HANDS!
CHAPTER 15

CONCLUSION TO THE LITERATURE REVIEW

The countryside is part of the environment utilised for human activity, and there is much value for humans in activities in the countryside but hazards abound, although many can be avoided or reduced with simple measures and increased knowledge.

Several of the authors referred to in this literature review have noted that improvements in occupational health generally are not reflected to the same degree within the farming industry compared with other industries, especially those designated as heavy such as mining and forestry. A number of factors have been cited as problematic for the farming industry and it is these that make the industry different from the majority of workplace situations.

Appreciating the number of events occurring to cause farm related injury is important. Understanding the nature, cause and effect of that injury has value for preventative strategy. Transporting the industry from the home based roots of the family farming enterprise to the hierarchical management based industry, the norm for the majority of productive enterprises, may prepare the industry for a change of attitude. Improved investment in safety awareness is essential and so evidentially needed to reduce at source accidents and illness and to implement the occupation health standards readily accepted in industry.

Farming enterprise in the United Kingdom is changing and moving in this direction with the advent of contract farming, co-operatives and larger agricultural units. Opportunities for occupational health and education, considering the three-pronged approach -

- Education
- Engineering
- Legislation

To facilitate these approaches additional financial investment and incentive at farm level, must co-exist with the expert advice to achieve change.
# GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>Loss of foetus before it is mature enough to survive outside the womb.</td>
</tr>
<tr>
<td>Aerosols</td>
<td>Fine particles as spray in the air.</td>
</tr>
<tr>
<td>Amputation</td>
<td>Removal of part of the body by surgery or accident</td>
</tr>
<tr>
<td>Anaerobic</td>
<td>Living or reproducing in the absence of oxygen</td>
</tr>
<tr>
<td>Anaphylactic shock</td>
<td>Severe allergic shock which may cause death.</td>
</tr>
<tr>
<td>Antibody</td>
<td>A protein substance called an immunoglobulin produced in response to an antigen.</td>
</tr>
<tr>
<td>Asphyxia</td>
<td>Suffocation or interference with a free airway</td>
</tr>
<tr>
<td>Avulsion</td>
<td>Forcible tearing off of part of the body.</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Faculty of knowing and understanding.</td>
</tr>
<tr>
<td>Colitis</td>
<td>Inflammation of the colon.</td>
</tr>
<tr>
<td>Concussion</td>
<td>Temporary lose of consciousness.</td>
</tr>
<tr>
<td>Contusion</td>
<td>Bruise.</td>
</tr>
<tr>
<td>Dislocation</td>
<td>Separation of the bearing parts of a joint.</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>Inflammation of the inner linings of the heart and valves.</td>
</tr>
<tr>
<td>Enteric</td>
<td>Pertaining to the small intestine.</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>Study of the source, spread and nature of disease.</td>
</tr>
<tr>
<td>Epizootic</td>
<td>Affecting a large number of animals in a short period.</td>
</tr>
<tr>
<td>Experiental</td>
<td>Learning by experience.</td>
</tr>
<tr>
<td>Fomites</td>
<td>Inanimate objects which have been contaminated with infection and can thus transmit it.</td>
</tr>
<tr>
<td>Foreign Body</td>
<td>Something not of the body which has invaded it.</td>
</tr>
<tr>
<td>Fracture</td>
<td>A break of the bone.</td>
</tr>
<tr>
<td>Gastro intestinal</td>
<td>Of the stomach and intestines.</td>
</tr>
<tr>
<td>Grain Bin</td>
<td>Tall tower for storing grain usually with doors at a lower level.</td>
</tr>
<tr>
<td>Guard</td>
<td>A barrier or protection from contact with moving parts.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Haematomas</td>
<td>A leakage of blood from a damaged vessel into muscle or under the skin.</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>Inflammation of the liver</td>
</tr>
<tr>
<td>Immuno suppressed</td>
<td>Depressed or lowered immune function due to medication or illness.</td>
</tr>
<tr>
<td>Laceration</td>
<td>Cut</td>
</tr>
<tr>
<td>Manure (muck)</td>
<td>A mixture of animal faeces, urine and bedding, usually composted before being spread on fields.</td>
</tr>
<tr>
<td>Medication</td>
<td>Prescribed or purchased medicines</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Illness</td>
</tr>
<tr>
<td>Mortality</td>
<td>Death</td>
</tr>
<tr>
<td>Muck spreading</td>
<td>Spreading of animal faeces and bedding on pasture or the soil.</td>
</tr>
<tr>
<td>Pathogenic organism</td>
<td>Capable of causing disease.</td>
</tr>
<tr>
<td>Physical</td>
<td>Height to weight ratio (in this sense referred to in this study)</td>
</tr>
<tr>
<td>Power take Off</td>
<td>Distribution of power from a tractor to a machine being towed to mechanise it.</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Care provided at the first level—a General Practitioner.</td>
</tr>
<tr>
<td>Ruminant</td>
<td>Cud-chewing animal.</td>
</tr>
<tr>
<td>Sero Prevalence</td>
<td>The prevalence in numbers of a serotype antibody.</td>
</tr>
<tr>
<td>Serology</td>
<td>The testing of blood serum for antibodies.</td>
</tr>
<tr>
<td>Set aside</td>
<td>Land not actively farmed</td>
</tr>
<tr>
<td>Sheep Dip Bath</td>
<td>A pit of water and chemical for the purpose of immersing sheep to prevent and to treat sheep for ectoparasites.</td>
</tr>
<tr>
<td>Silo</td>
<td>A tower to hold animal feeds or silage.</td>
</tr>
<tr>
<td>Slurry</td>
<td>Liquid faecal and urine waste from cattle or pigs that are housed. It is stored in pits, tanks or lagoons before being spread on land.</td>
</tr>
<tr>
<td>Toxin</td>
<td>Any substance produced by a living organism that is poisonous to another living organism.</td>
</tr>
<tr>
<td>Uraemic</td>
<td>The accumulation of nitrogenous waste products of metabolism in the blood as a result of renal failure.</td>
</tr>
<tr>
<td>Vector</td>
<td>An insect or animal capable of transmitting an infection to another by allowing the organism to multiply within it but not succumbing to infection itself.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Welding</td>
<td>To unite metal with heat generated using electric arc or gas.</td>
</tr>
<tr>
<td>Zoonoses</td>
<td>Diseases that are transmissible between vertebrate animals and man. Occasionally they can go from man to animals.</td>
</tr>
</tbody>
</table>
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