Veterinary Sciences Division

Reducing cattle deaths

Department of Agriculture
and Rural Development

REDUCING CATTLE DEATHS

This booklet contains a compilation of articles describing the major diseases/conditions responsible for cattle deaths in Northern Ireland and the measures which are currently available for their control. These articles are based on the findings from the 1992 Bovine Mortality Survey which was carried out by the Veterinary Sciences Division of the Department of Agriculture for Northern Ireland.

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Note: A pocket is provided at the back of this booklet in which you may wish to store DANI articles/handouts on animal health acquired in the future.

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SUMMARY OF THE FINDINGS FROM THE 1992 BOVINE MORTALITY SURVEY

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During 1992, as part of an initiative aimed at reducing the number of cattle deaths in Northern Ireland, a bovine mortality survey was carried out. The aims of the survey were to determine the number of deaths in various age groups and types of cattle and to assess the relative importance of the various diseases responsible for the majority of these deaths. It revealed that **the direct cost to the cattle industry in Northern Ireland from these deaths alone was estimated to be almost £11m (at 1992 prices).**

This survey was conducted on a random sample of farms and veterinary practices. In the farm survey, over 3,500 cattle deaths were reported from 1,069 farms during the year. A further 237 farms reported no cattle deaths during 1992. Response rates were very similar over different types and sizes of cattle herds. In the veterinary practice survey, over 1,700 cattle deaths were reported.

On the basis of analysis of these returns, it was estimated that the total number of cattle deaths in Northern Ireland during 1992 was 23,113 which included 5,997 suckler cow deaths, 4,246 dairy cow deaths, 12,332 deaths in young stock and 538 fatstock/bull deaths. In addition, there were an estimated 7,921 stillbirths. The overall annual mortality rate was estimated to be 1.5% (2% if stillbirths were included). The mortality rate was higher in suckler cows than in dairy cows. Smaller herds showed consistently higher death rates in all animal types. Such mortality rates were generally lower than those described in other countries. The major causes of death in the various categories of stock are briefly highlighted below. Most of the results cited relate to the farm survey. However, in general there was good agreement between the farm and veterinary practice surveys.

One third of suckler cows and one fifth of dairy cows which die each year are 'found dead'.

SUCKLER COWS

Almost one third of suckler cow mortalities were associated with conditions occurring at or around the time of calving. Examples include severe calf-bed infection (metritis) and the downer cow syndrome, many cases of which are due to difficult calving. Mastitis was also a significant cause of death in suckler cows, accounting for an additional 11% of deaths identified. Acute coliform mastitis, which often occurs shortly after calving, was the most important type.

Grass tetany (hypomagnesaemic tetany) was a major cause of suckler cow mortality. Also, 33% of suckler cow deaths were reported as animals 'found dead' – the great majority without any obvious cause. Many of these deaths occurred during the recognised spring and autumn danger periods for grass tetany. Indeed, over one third (36%) of these unexplained deaths occurred during September and October. A province-wide survey of blood magnesium levels in cows concurrently carried out by the Veterinary Sciences Division during 1992 found October to be the month in which the highest proportion of suckler cows had low levels of blood magnesium. In fact 43% of suckler cows tested in October 1992 were low in blood magnesium. It is highly probable, therefore, that very acute grass tetany was responsible for many of these unexplained sudden deaths. This highlights the need for continuing development of methods to confirm diagnosis of grass tetany after death.

DAIRY COWS

Conditions associated with calving accounted for 31% of deaths in dairy cows in which clinical signs were observed prior to death. Such conditions included the downer cow syndrome, nerve paralysis, post-calving haemorrhage and acute calf-bed infections. Mastitis accounted for 17% of the dairy cow deaths in which clinical signs were observed before death, with the most important type being acute coliform mastitis (responsible for 12%). Coliform mastitis was identified as the **single** most important cause of death in dairy cows.

The farm survey also indicated that 14% of dairy cows were found dead from undetermined causes. The majority of these deaths occurred during the recognised spring and autumn danger periods for grass tetany.

The veterinary practice survey also reported coliform mastitis (16%) as the main single cause of dairy cow deaths. Overall, mastitis accounted for 25% of dairy cow deaths in the veterinary practice survey and the same percentage of deaths was attributed to conditions associated with calving.

CALVES UNDER ONE MONTH OLD

Stillbirths accounted for 28% of all reported deaths. Farmers reported that 62% of all deaths in calves under one month old were stillbirths. Difficulty in calving (34%) was the single most common factor associated with stillbirths. Deformed calves accounted for 6%, while stillbirths with no apparent physical cause accounted for 5% of deaths in this group.

The neonatal disease complex (39%) was identified as being the cause of the majority of deaths in calves which were born alive within this age group. Nearly half of the calves which were born alive but died within the first month of life showed signs of scour before death. In addition to scour caused by agents such as rotavirus, *E. coli* bacteria and cryptosporidia, the neonatal disease complex includes conditions such as colisepticaemia, navel-ill, meningitis and neonatal pneumonia.

In the veterinary practice survey, stillbirths associated with difficult calvings (18%) and colisepticaemia (15%) were the main causes of mortality in calves under one month old.

1-5 MONTH OLD CALVES

Respiratory disease (37%) was the most common cause of mortalities in this age group. Bovine viral diarrhoea/mucosal disease (10%), colic (6%), undifferentiated scour (6%) and blackleg (5%) were also reported as common causes of mortality. With the exception of blackleg, all of the above conditions were amongst the top six diagnoses in mortalities in 1-5 month old calves reported by veterinary practices. Approximately 20% of fatalities in this age group were animals found dead with no previous signs of illness.

6-24 MONTH OLD CATTLE

Nearly one-quarter of mortalities within this age group were animals found dead with no previous signs of illness. Respiratory and gastro-intestinal diseases were identified in both the farm and veterinary practice survey as the main causes of mortality. In the farm survey, respiratory disease (37%) was the main cause of mortality. Bovine viral diarrhoea/mucosal disease (BVD/MD) accounted for 7% of deaths. Fractures (5%) and blackleg (5%) were also identified as causes of loss in this age group. Pneumonia and BVD/MD were again the main causes of mortality identified by veterinary practices.

THE WAY FORWARD

This survey has highlighted the major causes of cattle deaths in Northern Ireland. The number of deaths due to several of these conditions could be reduced by careful attention to management and by optimal application of available preventative measures, under veterinary guidance. The subsequent articles in this booklet contain information on the measures which are currently available for control/prevention of the main diseases and syndromes identified by the survey. It is hoped that this will further empower farmers, in collaboration with their veterinary surgeons, to adopt future strategies which will reduce these considerable losses from bovine mortality.

MANAGEMENT OF THE COW AT CALVING

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The recent survey carried out by the Department of Agriculture for Northern Ireland on causes of death in cattle revealed that one out of every three dairy and suckler cow deaths occurred around the time of calving. Severe infection of the calf-bed, nerve paralysis and the downer cow syndrome were the most important causes. This article highlights practical steps which can be taken to minimise the chance of disease and death at this crucial time.

CONTROL OF CALF SIZE

The most important influence on calving difficulty is calf size, which can be controlled by choice of bull and level of feeding in the last three months of pregnancy. Although pregnancy in cows lasts approximately 280 days, this interval can be as long as 300 days and is largely dependent on the bull used. As a rule, the use of Continental beef sires tends to lengthen the period. With artificial insemination, it is possible to select a bull with a proven track record for easy calving. However, with natural service it can be much harder to predict ease of calving and impossible where a young bull is being used for the first time. Within breeds there can be considerable variation in ease of calving, so choosing an easy calving breed may not necessarily mean that you will not have trouble with an individual bull. Generally, maiden heifers should never be bulled with heavy beef breeds as the likelihood of a large calf and a difficult calving is very high. Any potential benefit from using a large beef breed to improve calf price is far outweighed by the risk of losing the calf and possibly the cow as well.

PRE-CALVING FEEDING

Condition scoring

The simplest and most practical indicator of nutritional status is condition scoring. It is a technique which can be easily learned and identifies cows which are over-fat or those that are too thin. If carried out at monthly intervals it will help you take effective early action to remedy the situation. The ideal condition score for a dairy cow at calving is 3.5.

Over-fatness at calving is caused by excessive weight gain in the last third of pregnancy, particularly in late lactation. Typically, this arises in the dairy cow because concentrates are fed at flat rate regardless of stage of lactation, either in the parlour or using a complete diet feeding system. Over-fatness is likely to lead to calving difficulty and subsequent infertility. Detection and remedial action are needed three months before calving. It is stressed that cows with a condition score of 3.5-4 at this time are most susceptible and need drastic treatment (one condition score point in late pregnancy roughly equals 100kg live-weight). This effectively means separation from the rest of the herd and a diet of straw and water or restricted silage. Contact your local Agriculture Development Centre for further advice.

The thin cow should also be detected and given extra feed early on, otherwise weak calves, post-calving infection and subsequent infertility are likely. Such cows should be separated out and fed supplemental silage (easy-feed is better than self-feed) and low levels of concentrates (approximately 1kg daily, depending on the quality of the silage). This situation tends to be more common in the suckler herd. Thin suckler cows should have their calves weaned early to allow them to achieve target condition score at calving.

Mineral status

Your veterinary surgeon can best advise you about the mineral status of your herd after blood sampling dry cows. Northern Ireland is known to have large areas of land which are deficient in selenium and iodine. These deficiencies may affect cows during the dry period, especially if they are not getting any supplemental concentrate feeding. Therefore, it is useful to feed a mineral supplement in the last two months prior to calving. This is the cheapest and easiest way of getting vital minerals and vitamins into the cow during the dry period. Most compounders have proprietary formulations specifically for this purpose. Supplements should also be low in calcium and high in magnesium to help avoid milk fever and grass tetany. Supplements can be dusted over silage twice daily or, if at grass, fed in a carrier such as 0.5kg rolled barley or beet pulp. It is better to feed supplements in this manner rather than to rely on free access minerals. While free access minerals are undoubtedly easier to work with, they are not taken equally by all cows and therefore individual animals are likely to be deficient.

CALVING

The signs of calving are well-known, for example, springing of the udder, restlessness, raised tail, straining, appearance of the water bag. Most calving difficulties arise from large calves which may be presented incorrectly. Once a cow shows signs of calving, she should be removed from the rest of the herd and put in a clean well-bedded pen. Then give her time – hasten slowly! The cleaner the pen the less likely it is that the cow and the calf will pick up infection after calving. Deep, soft bedding minimises the chance of the cow going down and injuring her legs, ‘doing the splits’ and/or causing nerve damage. The restless phase lasts approximately twelve hours. Cows need time to relax and get comfortable before labour gets properly underway. Rapid intervention is a big mistake and will only lead to worse problems. However, if after twelve hours of restlessness the cow has not started to strain, veterinary advice should be sought. A twisted calf-bed, for example, is a possible diagnosis in such cases.

Normally, once a cow has started straining and pushing vigorously, the water bag should either burst or appear intact. After this has occurred calving usually takes place within 4-6 hours. If nothing has happened after three hours, in spite of strong pressing, it is likely that there is an obstruction. This could be due to either a large calf which is too big to pass through the birth canal, or alternatively the calf could be coming backwards. At this stage, seek veterinary advice before the cow becomes too tired.

ASSISTING CALVINGS

Cleanliness is important, since if dirt gets into the cow's uterus during calving there is an increased risk of infection. Before any interference, the cow's vulva should be thoroughly cleaned with soap and water. The operator's hands and arms should be well washed and lubricated with soap or a proprietary obstetrical lubricant. It is important to be gentle at all times as it is easy to bruise and tear the vagina. Simple malpresentations, such as a foot down, can easily be corrected with experience. However, knowing when to stop and call in your veterinary surgeon is crucial. For example, with a large calf, an early decision on whether or not to opt for a caesarean section can make all the difference to the survival of both cow and calf. Remember, the calving jack is one of the most useful but potentially dangerous tools on the farm when used by an inexperienced person. To put it into perspective, the pressure exerted by a calving jack can be equivalent to the pulling power of forty men! If in any doubt, consult your veterinary surgeon.

AFTER CALVING

Stimulating breathing

After a normal unassisted calving, the calf will usually start breathing by itself. After an assisted birth, this is often not the case, and there are a few things that should be done immediately. If it has been a particularly hard pull, the calf should be held up by its back legs to let any fluid in the lungs drain out. The nose and mouth should be cleared of any foetal membranes and a finger inserted into the mouth to make sure this is the case. The chest area should be massaged vigorously with some straw.

Alternatively, the calf can be laid on its side and the back and foreleg grabbed and moved in a scissor-like fashion. This will help stimulate breathing. If the calf is still not breathing, a stiff piece of straw should be inserted into one or both nostrils and twiddled about. This action stimulates the centres in the brain which control breathing. There are drugs available from your veterinary surgeon which will also stimulate breathing in the newborn calf.

The umbilical cord

In many calvings, the umbilical cord which attaches the calf's navel to the cow will snap itself. If the cord has snapped and the calving pen is clean, there is no real need to do anything. However, if the pen is dirty or, for example, if the calf has been born in the cubicle house, its navel should be sprayed or dipped in dilute iodine. A 2% solution is strong enough. Stronger solutions can burn the navel and cause a navel abscess. If the cord has not been broken, it is best left alone. There is still blood flowing from the cow to the calf through this cord and to cut it would deprive the calf of blood which it needs. The cord will break off itself when the cow licks the calf. At this stage you may want to apply iodine solution.

The cow

After an assisted delivery it is important to check the cow manually for tears in the calf-bed and internal bleeding. This requires experience and your veterinary surgeon is the best person for the job. Antibiotics should be used only with caution and under veterinary advice. Veterinary surgeons frequently find cows which, after a tough calving, are fit only for slaughter but, because they have been injected with antibiotic, will not pass meat inspection at the abattoir. If in any doubt, your veterinary surgeon should always be consulted. There should be no need to use antibiotics, providing the delivery has been fairly straightforward and has taken place in a clean area.

If the afterbirth does not come away at calving you should not attempt to forcibly remove it. Most afterbirths will be passed within twelve hours. Any that are retained longer than this should be left for at least four days before attempting manual removal. Again, your veterinary surgeon is the best person to consult.

If the cow goes down at calving and is reluctant to get up, there are a number of possible causes. Examination is recommended of all such cases by your veterinary surgeon to differentiate between causes such as extreme exhaustion, milk fever, mastitis, internal bleeding, nerve damage, broken leg etc. The value of prompt diagnosis and treatment cannot be stressed enough.

CONCLUSIONS

In summary, choice of bull and pre-calving nutrition have a major bearing on calving difficulty. Cleanliness and cow comfort are also vital to reduce the chances of post-calving infection in both the cow and calf. In every case, if there is a likelihood of complications veterinary advice should be sought early. By bearing these points in mind, it should be possible to reduce cow and calf losses at this crucial time.

MANAGEMENT OF THE SUCKLER HERD IN RELATION TO CALVING

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Excluding compensatory payments, the income from the suckler herd is largely made up of the sale of the calves produced by the herd during the year. The main factor which determines calf sale value is the gross weight of calves weaned which is influenced by the length of the calving season. Approximately 75% of suckler herds in the United Kingdom have a calving season which extends to five months or more. Such an extended calving season decreases profitability due to the adverse effects of a number of factors which are discussed below.

CALF MORTALITY AND DISEASE

An extended calving season allows accumulation of infection in the environment which can increase the levels of disease and death in susceptible late-born autumn calves. Calf deaths can be as high as 25% among those born at the tail-end of the calving season. After stillbirths, scour and pneumonia are the major causes of mortality in young calves. These diseases can also lead to decreased growth rates in affected animals which survive.

WEANING WEIGHT

The average weaning weight of healthy suckler calves is mainly dependent on their average age. Thus the higher the proportion of calves born during the first three weeks of the calving period, the higher the average weaning weight and income will be. It has been demonstrated that decreasing the calving period from five months to two months will increase average weaning weights of calves by up to 47kg.

BARREN COWS

The duration of pregnancy in the cow is approximately 280 days. This limits the time in which a cow must conceive to less than 85 days if she is to calve at the same time the following year. With an extended calving period, a proportion of the suckler cows will not have calved by the start of the mating period. Hence, within a seasonal calving herd, there is a high probability that these late calvers will end up barren. A large proportion of the barren cows in suckler herds are young cows that have produced only one or two calves. This is because first calving heifers take longer to return to heat after calving. The loss of young cows from the herd is unacceptable as they are relatively expensive to replace. Thus, barrenness may lead to them being kept for an unproductive year until the next mating period.

HOME-BRED REPLACEMENTS

In a herd with an extended calving period, in which home-bred heifers are kept for replacements, there are far fewer heifers of an adequate body weight available for breeding at the start of the mating period.

FEEDING

Feeding accounts for over 75% of the variable costs of keeping a suckler herd and, therefore, feed needs to be efficiently utilised to minimise unnecessary expense. It is difficult to feed a herd to a recommended requirement when calving takes place over a long period of time and, therefore, a proportion of cows within the herds tend to be fed more than is necessary. Correct nutritional management is much more easily achieved with a two month calving period.

REPRODUCTIVE TARGET

Management of the suckler herd in relation to fertility should aim for 95% of the cows being pregnant from a 63-day mating period with 80% or more of the cows being pregnant within the first 42 days. This should be achieved with the herd calving down at the same time of year, every year.

HOW TO ACHIEVE AND MAINTAIN THE REPRODUCTIVE TARGET

The key to a compact calving lies with proper heifer management and in ensuring that all cows are in adequate body condition at critical times during the year, particularly at calving. The following points highlight the necessary steps to ensure a successful progression to a compact calving pattern. A compact calving **cannot** be achieved without proper heifer management.

Heifer management

- Aim to have heifers at 70% of their expected mature weight and in condition score 3 at mating.
- Mate heifers at least two weeks before the main herd.
- Mate heifers for 42-45 days only.
- If possible, use ‘easy calving’ bulls on heifers.
- Aim to have heifers in condition score 3 at calving.
- Keep first calving heifers in a separate group and allow extra feeding to accommodate their growth requirements.

Nutritional management

Optimum condition at calving and proper heifer management are the key to success in the management of the suckler herd.

Body condition can be assessed accurately by condition scoring which measures the amount of fat reserves of a cow. This is performed by feeling the spinous processes of the backbone and the fat cover over the tail head. More details on condition scoring can be obtained from your local Agriculture Development Centre.

The most critical time with regard to body condition for the suckler cow is at calving. If she is too thin or too fat, this will lead to problems in getting her back into calf because of the delay in starting to cycle again. For a cow to be at the correct condition score for calving requires action several months before she gives birth. Each cow should be monitored and action should be taken when cows are too fat (over condition score 3.5) or too thin (under condition score 2) at strategic times of the year. In particular, cows in poor body condition should have their calves weaned early so that they have an opportunity to build up body reserves to the target condition score for calving. In general, the optimum condition score for suckler cows lies between 2.5 and 3.5. Cows should be in good condition at housing (condition score 3.5) and then steadily lose condition until turn-out in the spring (condition score 2.5).

General points

Use of cross-bred cows with a bull of a third breed will increase the profitability of a herd because of the beneficial effects of ‘hybrid vigour’. The type of cow used in a herd depends on the type of farm. The breed of bull used is determined by market forces and by personal preference. The critical point to remember in relation to bull selection is that there is more variation within bull breeds than between bull breeds with respect to growth rate and birth weight. That is, certain lineages within any breed will carry ‘easier calving’ traits than others. Selection of bulls descended from ‘easier calving’ lines will reduce calf losses associated with difficult calvings. It will also make it easier to maintain a compact calving period as cows which have a relatively trouble-free calving should have little problem in getting back into calf (provided they are at the correct condition score). Lighter boned bulls should be used to serve heifers. Use of oestrous synchronisation and artificial insemination may be a useful option to allow heifers to be served with a sire which is proven to produce easily calved off-spring.

The recommended cow to bull ratio is 20-35 cows to one bull, depending on the age and service capacity of the bull. Serving heifers at least two weeks before the main herd can help in maximising the utilisation of a bull within a herd. It is recommended to have bulls examined for fertility by a veterinary surgeon before the start of the mating period.

It is also worthwhile to have a herd pregnancy test performed by your veterinary surgeon. This is best carried out approximately eight weeks after the end of the mating period. Non-pregnant cows can then be ear-marked for early disposal, allowing conservation of expensive winter feedstuffs for more productive stock. If necessary, barren cows can be replaced by purchased heifers/cows which have been certified to be due to calve early within the herd's calving period. Heifers which are barren or which are not going to calve early in the calving period should be sold. Also, suckler cows should not be kept beyond the age of nine or ten years as cull cow values are dramatically reduced after this age.

Calves born in December-January tend to have lower live-weight gains than those born at other times of the year so avoid having the calving period during these months. Also, ensure that no management changes such as housing, dietary changes or mixing of cattle, take place during or shortly after the mating period as the associated stress will reduce pregnancy rates.

CONCLUSIONS

The profitability of the suckler herd is heavily dependent on achieving and maintaining a compact calving pattern. The key to this goal lies with the proper management of heifers and with cows being at their target condition score at calving.

COLIFORM MASTITIS

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The bovine mortality survey carried out by Veterinary Sciences Division identified coliform mastitis, or acute environmental mastitis, as one of the major killers of adult dairy and suckler cows in Northern Ireland. Unlike ordinary mastitis, the udder infection in the coliform version has been shown to be the result of exposure to bacteria that survive and, in the right conditions, multiply within the cow's environment. It is most common during the winter months when cattle are housed, particularly from December to March and often in milking herds which practice teat dipping and dry cow therapy. The affected herds are usually well-managed, the husbandry is good and the cows are mainly housed in cubicles and fed silage.

SIGNS AND SYMPTOMS

Typically, the condition occurs in freshly calved cows in their fourth or fifth lactation. It is uncommon in calved heifers. The bacteria involved are mostly the same as those excreted in cow faeces and *E. coli* are the most commonly isolated species – hence the general term coliform mastitis. Because these bacteria produce toxins the affected animal is often suddenly very ill, after being quite normal at the last milking or feeding time. The cow will be very depressed, sometimes down and unable to rise with a low body temperature – this can be confused with milk fever. There will be swelling of one or more of the mammary quarters with a watery mastitis. The overall survival rate is usually only 50% and urgent attention will be required from a veterinary surgeon who will use aggressive therapy, often including intravenous fluids, to save the life of the cow. Quarter sampling, for culture and drug sensitivity at a laboratory, will indicate the best form of antibiotic treatment to use in future cases. Recent evidence also suggests that stripping out of the infected quarter, every two or three hours, to remove the *E. coli* and its toxin, is a helpful procedure. Ironically the infected quarter, although lost to the present lactation, will return to almost full production in the next lactation, providing the cow survives.

CONTROL MEASURES

Calving boxes

Obviously, it is important to reduce the level of faecal contamination in the cow's immediate environment. Because freshly calved cows have a depressed immune system, they are known to be more susceptible to coliform mastitis. Consequently, it is essential to clean out calving boxes at regular intervals, certainly at least two or three times during the winter months and particularly after a coliform mastitis has occurred, as this indicates that the environment is heavily contaminated with *E. coli*.

Cubicles

It is equally important to keep the rest of the cow's environment as clean as possible. Scrape out the backs of cubicles and passageways at least twice a day and bed down the cubicles at least three times per week with sufficient material to make the cows use them. Unfortunately, the bacteria can multiply in dirty damp bedding, particularly if it is the type of material that could act as a compost, for example, materials such as sawdust, mushroom compost, chopped paper and peat. These will require more attention than biologically inactive materials such as crushed limestone, sand and rubber mats. However, all of these are useless if they become contaminated and are continually damp because the ventilation within the cubicle house is inadequate. Dry bedding in a well-ventilated house with slotted roofs and Yorkshire cladding will help inhibit the multiplication of *E. coli*.

Scrape out the backs of cubicles at least twice daily to help prevent coliform mastitis.

BEFORE AND AFTER MILKING

In the parlour, make sure that the cow's teats are cleaned and dried before milking. Drying is particularly important, as washing without it just produces a heavily contaminated drip at the end of each teat. Also, make sure that the milking machine is cleaned adequately after each milking with a temperature that exceeds 85°C to ensure the destruction of coliform bacteria. High Total Bacterial Counts (TBC) are a sure sign that one, or all, of these tasks are not being done properly.

Finally, infection can also take place immediately after milking, particularly when the teat canal is still open and the cow leaves the parlour to lie in a dirty cubicle. Closure of this canal takes 20-30 minutes and if the cow can be kept on her feet for this period, say at the silo face because she is hungry, then disease incidence will fall. Reducing concentrate levels in the parlour and closing the cows out of the silo for 1-2 hours before the afternoon milking will have the desired effect.

CONCLUSIONS

- Coliform mastitis is caused by faecal organisms.
- The condition is life threatening so get immediate veterinary help.
- Control measures should be aimed at reducing the environmental levels of *E. coli.*
- Keep the cows on their feet for 30 minutes after milking to reduce infection of the teat canal.

GRASS TETANY

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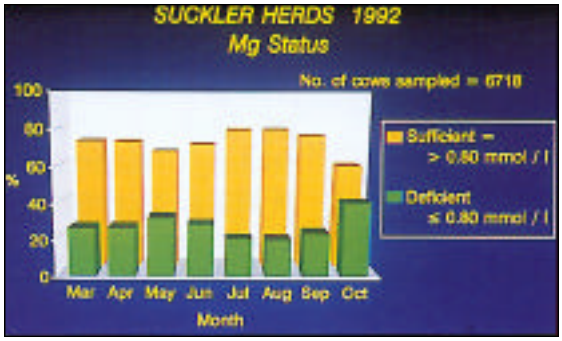
The bovine mortality survey conducted by the Department of Agriculture's Veterinary Sciences Division (VSD) during 1992 confirmed that grass tetany (hypomagnesaemic tetany) continues to be a major cause of cow mortality, particularly in suckler cows. Approximately 20% of suckler cows examined by a veterinary surgeon before death were diagnosed as having grass tetany. These deaths from grass tetany occurred mainly in recognised danger periods of spring and autumn. Also, 33% of suckler cow deaths were reported as animals which were 'found dead'. Over one-third of these unexplained deaths occurred during September and October. A province-wide survey of blood magnesium levels in cows concurrently carried out by the Biochemistry Section of Veterinary Sciences Division, found October to be the month in which the highest proportion of suckler cows (43%) had low blood magnesium levels. Therefore, it is highly probable that acute grass tetany was responsible for a large proportion of these unexplained sudden deaths.



Many suckler cows have low blood magnesium levels and therefore are at risk from grass tetany. Supplementation of the diet with magnesium is necessary, especially during the spring and autumn danger periods.

Surveys of blood magnesium concentrations conducted during 1991 and 1992 found that in addition to autumn, the spring period, with its variable climatic conditions and the rush of fresh grass which is low in magnesium, was a particularly high risk period. Indeed, sudden deterioration in weather conditions at any time of the year appears to precipitate a large increase in the number of magnesium deficient animals, leading to severe outbreaks of grass tetany.

All cows with low blood magnesium levels do not develop grass tetany. However, low blood magnesium (hypomagnesaemia) can also cause a variety of production problems. Depression of appetite, drop in milk yield, decreased fertility and an increase in the incidence of milk fever have all been associated with chronic hypomagnesaemia. It is estimated that these production losses may be costing the Northern Ireland Dairy Industry £3.5m per annum.

CLINICAL SIGNS

The clinical signs of grass tetany are well-known. Initially, animals become nervous and excitable with a staggering gait. This can quickly progress to lateral recumbency, convulsions, coma and ultimately death. However, because of the short duration of clinical signs, animals are very often found dead.

It is worth noting that most cases of grass tetany will have shown suspicious signs within the preceding few days. These include drop in milk yield, loss of condition and change in temperament. Careful observation of stock to detect such changes is therefore essential.

DIAGNOSIS

As the clinical signs are quite characteristic, diagnosis in the live animal generally presents little difficulty. Blood samples can be used to confirm diagnosis and, along with urine samples, can also be used to monitor overall herd magnesium status. However, in many cases animals with grass tetany are found dead and there is as yet no reliable test to aid diagnosis on post-mortem examination. Consequently, work is currently being undertaken at Veterinary Sciences Division to try to develop better diagnostic tests which could be used for this purpose.

TREATMENT

Clinical cases need rapid treatment with injectable magnesium salts. Veterinary attention should always be sought as treatment will usually include a degree of sedation. Animals recovering from grass tetany require further magnesium supplementation with 60g (2oz) daily of calcined magnesite orally for up to 10 to 12 days. Increasing magnesium supplementation of the rest of the herd is also advisable.

PREVENTION

Cows cannot mobilise magnesium from body stores, such as bone, and therefore need a continuous supply of 30g of magnesium per cow per day (equivalent to 60g (2oz) of calcined magnesite per cow per day), especially during spring and autumn.

It must be stressed that cows need a continuous daily intake of supplementary magnesium (by supplementation of meal, pasture dusting, silage and/or meal dusting). Those methods relying on free-access (magnesium tubs, blocks or licks) do not guarantee sufficient individual animal intake.

Methods currently available for supplementing the diet with magnesium can be found in Table 1, page 22.

Table 1. Methods of magnesium (Mg) supplementation

METHOD	TYPE OF MAGNESIUM/ RATE	PRECAUTIONS	ADVANTAGES	DISADVANTAGES
Magnesium-rich concentrates	Calcined magnesite 60g/cow/day (supplying 30g Mg/cow/day)		Effective	May be problems with palatability leading to refusal by some animals. Excessive intakes can cause scouring.
Dusting magnesium powder over meal or silage	Calcined magnesite 60g/cow/day		Effective	May be problems with palatability leading to refusal by some animals. Excessive intakes can cause scouring.
Pasture dusting	Finely powdered calcined magnesite. a. 5-7 kg/acre – strip grazing b. 10-14 kg/acre – paddock or set stocking.	Best done when grass is damp. Dust before every grazing. One application may last up to 10 days depending on weather conditions.	Effective	Labour intensive. Heavy rainfall will wash it off. Does not work on bare pasture.
Magnesium added to drinking water	Soluble Mg salts (acetate, chloride, sulphate); supplying 20g Mg/cow/day.	Use pump dispenser. Supplemented water must be the only source of drinking water.	Effective during periods of high trough water intake.	Trough water intake is lowest during wet, cold spells and low during first 4 days after turn-out (ie high risk periods).
Magnesium bullets	2 bullets given orally, 2 days before expected risk period.		Provides some protection for a 4-5 week period only.	Will not restore blood Mg levels to accepted normals. Some bullets will be lost by regurgitation, leaving those animals unprotected.
High magnesium hardened blocks or Liquid mix of molasses + calcined magnesite (1:1 ratio).	Free access			Intakes vary widely (up to 40-fold) between animals, some consume little or none, while others consume excessive amounts.

General measures

General measures to control grass tetany are as important as supplying additional dietary magnesium and should be used in conjunction with magnesium supplementation. These include:

- **providing adequate shelter** thereby reducing stress from inclement weather;
- **avoiding sudden changes in diet**;
- **feeding silage or hay after turn-out.** This slows the rate of passage of food through the gut thereby allowing greater magnesium absorption;
- **ensuring ample sodium (salt) in the diet.** Sodium is required for magnesium absorption;
- **encouraging the development of clover-rich pastures** which tend to have a higher magnesium content than grass swards;
- **avoiding the use of potash fertiliser on spring grass** as this will depress magnesium availability and absorption;
- **decreasing nitrogen fertiliser usage.** Excessive nitrogen decreases magnesium availability and absorption from the diet and increases magnesium excretion in the urine.
- **increasing the magnesium content of pastures by the use of magnesia limestone (dolomite).** It is well-worth considering this when liming is required. The effectiveness of this method, however, depends on the soil type.
- **sowing grass types with a higher magnesium content.** These are currently being developed in Northern Ireland and, when available, should offer another valuable control measure.

Conclusions

Despite the variety of control measures which are available, grass tetany remains a major cause of death in cows (particularly suckler cows) in Northern Ireland. Regrettably, the magnesium survey carried out by VSD in 1992 showed that over 20% of suckler herd owners use no preventative measures at all to control tetany at any time of year.

Control measures need to be fully and properly implemented, particularly during the high risk periods associated with rapid deterioration in weather conditions, particularly in the spring and autumn. **Your veterinary surgeon should be consulted for advice on the control strategies best suited to your farm.**

PREVENTION OF CALF DEATHS AT CALVING

Maurice McCoy MVB MRCVS
& Joan Smyth MVB PhD MRCVS
Veterinary Sciences Division

The recent bovine mortality survey carried out by the Department of Agriculture's Veterinary Sciences Division estimated that nearly 2% of all calves are either born dead at term (stillborn) or die within two hours of birth. The incidence of such deaths can be up to 15% on some farms, causing major economic loss. Most of these losses are the result of dystokia (calving difficulty) which, if not properly remedied, results in the calf being deprived of oxygen (anoxia). Such a calf may die during the birth process or may be unable to commence breathing after birth. Some deaths are the result of severe trauma suffered during assisted calving. Other possible causes of calf death include infectious diseases, poor nutrition and fatal congenital defects.

TRAUMA

Of calves dying at birth in Northern Ireland, 21% of those examined at the Veterinary Sciences Division had evidence of severe trauma (fractured ribs, fractured spine). Most of these calves were the product of assisted deliveries. Although many were assisted because the cow was apparently making no effort to calve or the calf was not positioned properly, in many cases the farmer had no reason to assist other than being there at the time. It is clear that farmers need to be very careful when lending assistance at calvings, especially when using calving jacks. These devices can produce a powerful pulling force, many times greater than can be generated by a manual pull. Furthermore, assisting too early in the calving process is an important cause of incomplete opening of the birth canal. **It is important to know the correct time to lend assistance. Careful observation is essential and prompt veterinary advice should be sought early whenever you are unsure.**

Adequate training and experience in the management of the calving cow is required. The Department regularly runs a short training course entitled 'Care of the Calving Cow'. For further information contact your local Agriculture Development Centre.

CAUSES OF DYSTOKIA

Relative calf oversize

This may result from a large calf *per se* but can also be a consequence of small dam size, therefore it is more common in heifers. Careful selection of the bull to be used, particularly on heifers, and avoidance of over-feeding in the last 2-3 months of pregnancy should reduce the incidence of relative calf oversize.

Incorrect position of the calf (malpresentation)

This has two effects. The first, and most obvious, is that the calf cannot be pushed through the birth canal if it is incorrectly positioned. Secondly, the gradual pushing of the calf into the birth canal is very important in dilating the birth canal. This cannot occur with some malpresentations.

A calf coming backwards (breech presentation) is five times more likely to die during calving than one coming normally. As twin calves are more likely to be breech presentation, twins are more likely to die at birth.

Inadequate explusive effort by the dam

Metabolic and hormonal status can effect the ability of the uterine (calf-bed) and abdominal muscles to contract and push the calf out. For example, low blood calcium levels (which can also lead to milk fever) can reduce the strength of uterine contractions and thus delay/prevent calving. To avoid low blood calcium levels at the time of calving, it is essential to avoid high calcium feeds (especially high calcium mineral mixes) and to maintain magnesium intakes during the dry period.

INFECTIOUS DISEASES

Infectious diseases such as leptospirosis and bovine viral diarrhoea/mucosal disease have been associated with stillbirths within some herds. Leptospirosis can be controlled by use of vaccines, sometimes in association with antibiotic treatment. Advice on this can be obtained from your veterinary surgeon. Bovine viral diarrhoea/mucosal disease is the subject of a subsequent article in this booklet.

POOR NUTRITION/DEFICIENCIES

It is generally accepted that poor nutrition during pregnancy, which is mainly seen in suckler herds, can lead to the birth of ‘soft’, weak calves which die soon after birth. Mineral deficiencies have also been associated with the birth of dead calves or of calves failing to breathe properly. Our research programme has examined the role of selenium and iodine in such losses and has also sought to improve our ability to diagnose deficiency of these minerals. While the latter objective has been largely successful, there are still some difficulties in diagnosing chronic iodine deficiency. We have carried out extensive on-farm investigations testing the effect of treatment of the dam during pregnancy with these minerals. We have, as yet, found no conclusive evidence that they are involved in calf losses. Consequently, we are not in a position to offer advice on mineral supplementation which would ensure the prevention of such losses.

CONGENITAL DEFECTS

Fatal congenital defects, for example, large interventricular septal defect (‘hole in the heart’) hydrocephalus (‘water on the brain’), are relatively uncommon but nevertheless contribute to losses at calving.

CONCLUSIONS

Stillbirths can be a serious problem on some farms. Your veterinary surgeon should be contacted immediately for assistance with individual problems such as difficult calvings. He/she is also in the best position to investigate and advise on herd problems with stillbirth/weak calf syndrome. Investigation will probably include submissions of samples to a veterinary laboratory. Samples should include the dead calf and the placenta (cleaning), as well as blood samples from dry and recently calved cows.

CONTROL AND PREVENTION OF CALF SCOUR

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Calf scour remains one of the most common reasons for submission of samples to the Department of Agriculture's Veterinary Sciences Division. The bovine mortality survey confirmed scour as the main clinical sign (48%) in calves which were born alive but died within the first month of life, and that undifferentiated scours and colisepticaemia were the main causes of death in young calves. Failure to thrive and the cost of treatment also contribute to the financial loss caused by scour.

COMMON CAUSES OF SCOUR

Most calf scours are caused by infectious agents. ***E. coli*** bacteria, **rotavirus** and **cryptosporidium** are common causes of scour in Northern Ireland and often a combination of these organisms is involved in outbreaks. In recent years additional causal organisms have been identified, some of which are associated with very severe forms of scour but, fortunately, these are relatively uncommon in Northern Ireland. Many cases of scour proceed very rapidly, causing severe dehydration and metabolic imbalance within a few hours of the onset of disease.

E. coli (K99 and F41) can cause very severe scour and dehydration in calves of less than one week old. Diarrhoea caused by *E. coli* can occur as early as 24 hours after birth, but seldom occurs after three days of age unless it occurs as part of a mixed infection with rotavirus and cryptosporidia.

E. coli can also invade the bloodstream, and cause **colisepticaemia**, a very severe infection which results in severe dullness, listlessness and collapse in calves of less than one week old, and is often fatal despite therapy. Disease produced by this organism is associated with the feeding of inadequate levels of colostrum.

Rotavirus can cause very severe scour and mortality in calves of up to two weeks old. The virus is widespread on most farms, and most calves will become infected at some stage, although not all infections produce disease.

Cryptosporidia are protozoal parasites which are present on many farms in Northern Ireland. Infection with cryptosporidia is important since this can contribute to severe scour when it occurs along with other disease producing organisms. There is also a potential risk of infection to humans who come into contact with infected calves, particularly to young children.

In addition to the common infections mentioned above, *Salmonella dublin* and *Salmonella typhimurium* are sometimes implicated in calf scour in Northern Ireland. These infections are most common in calves bought in from markets. Some of very resistant *Salmonella* infections of calves which are common in Great Britain have not as yet been recorded here. Disease caused by *Salmonella* is often very severe, and again there is an associated risk to human health.

DIAGNOSIS

Many scours, regardless of cause, present with a very similar clinical picture. However, the severity and character of the scour, other clinical signs and the age of the affected calves can all help the veterinary surgeon make a professional judgement as to the underlying cause. This will enable him/her to select the most appropriate therapy for acute cases.

If an effective approach is to be taken to a herd problem, it is vital for the veterinary surgeon to identify the agent or agents responsible for the problem. Veterinary laboratories provide a range of tests to assist the veterinary surgeon in diagnosis of individual animal and herd disease, and can advise on the most appropriate samples for examination. Frequently, examination of faeces samples from a group of calves can identify the organisms present in an outbreak. Occasionally however, routine tests fail to identify any specific organism, and further examinations are required to make an accurate diagnosis, for example, post-mortem examination.

Once the veterinary surgeon has reached a diagnosis, he/she can advise the farmer on control, prevention and treatment of the problem. The Veterinary Sciences Division can assist with the provision of specialist advice.

TREATMENT

Treatment of scour centres mainly on prevention of dehydration. In the early stages of disease, provision of fluids by mouth (oral rehydration therapy) is very effective, but on occasions the dehydration may be so severe that the veterinary surgeon must give fluids directly into the bloodstream.

Antibiotics should only be used for *E. coli* and *Salmonella* problems, and these should be given under the direction of a veterinary surgeon, as inappropriate use of antibiotics can lead to serious antibiotic resistance problems.

Careful attention to good husbandry and nursing, for example, providing additional heat and ensuring that the sick calf is on a draught-free, dry bed will greatly improve its chance of recovering.

CONTROL AND PREVENTION

Control of calf scour depends on four main principles:

- **Feeding plenty of colostrum immediately after birth**.

It is vital that calves get a feed of good quality colostrum as soon after birth as possible (within six hours of birth at the very latest). A minimum of two litres per calf is recommended. It may be necessary to give this by stomach tube to ensure each calf gets sufficient quantity. **Colostrum can be stored by freezing, and can be used to supplement the mother's own colostrum if she produces insufficient (typically a first calving heifer)**. Calves fed too little colostrum, or fed it too late, will have more disease problems, and are much more likely to die from septicaemia or scour. A veterinary laboratory can test colostrum and blood samples from calves to help assess the quality of the colostrum and efficiency of colostrum uptake by the calves.

- **Vaccination**

Vaccination is a very important weapon in the control of calf scour, and vaccines are now available to protect against some of the most important causes of scour such as *E. coli* and rotavirus. However, vaccination is unlikely to be effective unless used in conjunction with good husbandry. **Vaccination is not a replacement for good husbandry.**

There are several vaccination programmes available, and advice from your veterinary surgeon should be obtained for the most appropriate strategy for your farm. Some vaccines are given to the cow before calving, so that protection is passed on to the calf through her colostrum and milk. To be most effective, colostrum and milk must be fed for up two weeks, so that the protective antibodies are present in the calf's gut throughout the risk period. This often necessitates use of stored or pooled colostrum. However, there are occasional situations when that the use of pooled colostrum is inadvisable (for example, when the herd has a *Salmonella dublin* problem). Again, your veterinary surgeon can advise on this aspect.

- **Husbandry**

Studies have confirmed that calves housed in well bedded, dry, draught-free accommodation are less likely to succumb to disease, and even if they do develop scour, are much less likely to die as a result.

- **Reducing the burden of infection**

The environmental 'load' of infection increases as the calving season progresses, increasing the risk of scour and disease. Regular cleaning of calving pens (at least twice in a season), rigorous cleansing and disinfection of calf accommodation between batches, and rearing young calves separately from older animals will reduce the overall infective challenge. Within the suckler herd, a compact calving will help reduce calf deaths from scour as this will limit the build up of infectious organisms in the environment over the calving season.

CONCLUSIONS

Control and prevention of calf scour involves the use of good management practices such as:

- ensuring the calf is born and subsequently kept in a clean, dry, sheltered place;
- ensuring the calf receives adequate colostrum (two litres as soon as possible after birth);
- ensuring the calf receives its mother's colostrum and milk for at least the first two days of life;
- ensuring older calves are kept separate from younger calves;
- isolating any bought-in calves for at least ten days;
- operating an all-in, all-out system with thorough cleansing and disinfection of pens/areas between batches;
- if calves are bucket fed:
  - ensure regular feeding times,
  - ensure milk substitute is fed at the correct strength and temperature,
  - ensure correct positioning of feed buckets,
  - ensure buckets are thoroughly cleansed after use.

If scour is a problem on your farm, arrange through your veterinary surgeon to have scour and blood samples from untreated calves submitted to a veterinary laboratory for examination. Also, discuss using vaccination against *E. coli* and rotavirus with your veterinary surgeon.

ENZOOTIC CALF PNEUMONIA

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Respiratory diseases of cattle constitute a major problem in both economic and welfare terms to the rearing of young cattle in the United Kingdom. In the bovine mortality survey, respiratory disease in general, and pneumonia in particular, was identified as the most important cause of deaths in 1-5 month and 6-24 month age groups. Enzootic calf pneumonia ('virus pneumonia') is the most common and most important infectious pneumonia of young cattle.

WHAT IS ENZOOTIC CALF PNEUMONIA?

Enzootic calf pneumonia, previously known as 'virus pneumonia', is an infectious pneumonia of young housed calves usually occurring during their first period indoors. It is a complex disease, in which a number of infectious agents cause lung damage and in which certain management and environmental factors can predispose to the development of pneumonia.

ECONOMIC LOSS IN CALF PNEUMONIA

Severe outbreaks of pneumonia constitute an important source of economic loss, which derives from several causes:

- **Deaths**. In severe pneumonia outbreaks mortality rates of 5-10% are not uncommon.

- **Treatment costs**. The majority of animals in the group will require veterinary treatment.

- **Production loss**. This is a very significant cause of economic loss. In severe outbreaks calves can quickly lose condition. Even though the majority will survive, a proportion will be left with residual lung damage which can result in decreased live-weight gains in the weeks and months following the outbreak. Recent United Kingdom figures for cattle on an intensive cereal beef system indicated that pneumonic calves had a 10% poorer overall lifetime growth rate than healthy calves leading to an extra £54 food bill per calf to achieve the same live-weight targets.

OCCURRENCE AND CLINICAL SIGNS

Calf pneumonia can occur in any situation where groups of young calves are being reared indoors. Although animals ranging from a few weeks old to yearlings can be affected, outbreaks are most common in groups 2-6 months old, with a particularly high incidence in 2-4 month old cattle.

Outbreaks vary in severity. Frequent harsh coughing is a consistent clinical sign. In severe outbreaks several calves will have increased respiratory rates ('blowing'), and may become dull, have reduced appetites and lose condition. Some may develop severe respiratory distress with mouth breathing. Slight to moderate nasal discharge may be present. In severe outbreaks, the majority of calves within a group will be affected.

CAUSAL AGENTS IN CALF PNEUMONIA

A number of different infectious agents can be involved in the production of lung damage and this is one of the reasons why calf pneumonia is a difficult disease to prevent. Research work by the Veterinary Sciences Division (VSD) has identified the most important infectious agents:

Viruses. The most important virus is bovine respiratory syncytial virus (RSV). Parainfluenza-3 virus (PI3 virus) and bovine viral diarrhoea/mucosal disease virus (BVD/MD virus) can be involved in some outbreaks.

Bacteria. The most important bacteria involved are *Pasteurella* species and *Haemophilus somnus*.

Mycoplasmas. A recent worrying trend which we have detected at VSD, is a marked increase in the number of pneumonia incidents in which *Mycoplasma bovis* has been involved. Most of these have been on farms where cattle had recently been imported, with disease often originating in the imported animals but subsequently spreading to home-bred stock. *Mycoplasma bovis* is more virulent than other mycoplasmas commonly associated with calf pneumonia and can also cause arthritis and mastitis. It can be a difficult infection to treat effectively.

Many pneumonia outbreaks are initiated by virus infection which creates an initial focus of lung damage and lowers the resistance of the lungs to subsequent invasion by bacteria and mycoplasmas. On occasions, however, RSV can cause severe and sometimes fatal pneumonia by itself, with minimal involvement of other agents.

TREATMENT

In a pneumonia outbreak, prompt treatment from a veterinary surgeon is essential to minimise mortalities and the extent of lung damage. Do not 'dabble' in pneumonia treatment, as this can lead to unnecessary deaths, increased treatment costs and an increased incidence of residual lung damage.

No drugs with specific activity against respiratory viruses are commercially available for use in cattle. However, there are a number of broad spectrum antibacterial drugs available for control of lung damage caused by bacteria and mycoplasmas and antibiotic therapy is still the 'core' treatment for calf pneumonia.

In a mild outbreak only a few individual animals may be affected and require veterinary therapy. However, if a large number of calves in a group are showing significant signs of pneumonia then it may be prudent to treat the entire group. The choice and application of treatment in individual situations is best decided by your veterinary surgeon.

With severely affected animals, tender loving care will not go amiss, including separation into well-ventilated and well-bedded pens with provision of supplementary heat if necessary.

In the course of an outbreak, consultation should be carried out with your veterinary surgeon regarding possible submission of dead animals or samples from live animals to a veterinary laboratory for further examination. Such laboratory examinations can be important in helping to identify the main causal agents in a particular outbreak and in building up a picture of which drugs are most likely to be effective on a particular farm. Particularly on closed units, identification of infectious agents will be helpful in assessing whether or not the use of vaccines might be of value.

CONTROL

Enzootic calf pneumonia is a complex problem and there are no measures currently available which will guarantee total prevention. Nevertheless, steps can be taken to minimise the severity of outbreaks and to reduce the associated economic loss and improve animal welfare. A fight against calf pneumonia can be made on two fronts. Firstly, by eliminating as far as possible any management or environmental factors which may predispose to outbreaks. Secondly, by seeking to increase the immunity and resistance of the calf to the infectious agents which cause pneumonia.

The severity of respiratory disease can be reduced by ensuring calf houses are well-ventilated, while avoiding draughts at stock level and providing a dry, well-drained lying surface. Adequate ventilation can be achieved using mechanical systems, or by natural means which utilise the ‘stack effect’ and wind assisted ventilation. For effective ventilation it is important to provide adequate inlet and outlet space. When building new houses, siting of the long axis at right angles to the prevailing wind is recommended. More detailed advice on housing can be obtained through your local Agriculture Development Centre and from your veterinary surgeon.

Good ventilation is essential in reducing the risk of pneumonia.

It is helpful if calves can be reared in self-contained groups of similar age, thereby avoiding mixing of different age groups and spread of infection from older to younger calves. Ideally, not more than 30-50 calves should be reared in the same airspace. An all-in, all-out system allows resting and disinfection of houses. On individual farms, if pneumonia is occurring at predictable times, stressful procedures such as weaning, dehorning and castration should be avoided as far as possible during those risk periods.

Multiple movements of very young calves through markets represent a very severe stress factor which can result in rapid physical deterioration and increased susceptibility to a number of diseases including pneumonia.

Increased importation of cattle creates the risk of importation of disease. The increased incidence of *Mycoplasma bovis* associated pneumonia resulting from cattle imports has already been mentioned. There is a risk of importing even more serious diseases such as contagious bovine pleuropneumonia. If cattle must be imported, it is essential to seek advice from your local Divisional Veterinary Office and from your veterinary surgeon. An 'on-farm quarantine' of imported animals should be carried out for a period of at least four weeks and this should include a veterinary examination before such animals are allowed to come in contact with the remainder of the herd.

In seeking to increase the resistance of the calf, it is important to provide it with a good start in life by feeding adequate amounts (2-3 litres) of first milking colostrum immediately after birth and taking other measures to prevent scour as outlined in a previous article in this series. Occurrence of scour can sometimes predispose calves to pneumonia. Also, high levels of colostral antibody confer some, although not total, protection against several pneumonia agents during the first few weeks of life. Colostral antibodies to respiratory pathogens have largely disappeared by 3-4 months of age.

Vaccines can be used to help stimulate the animal's own active immunity to respiratory pathogens. Development of immunity to RSV is particularly important. There are vaccines currently available against important pneumonia agents such as RSV, PI3 virus and *Pasteurella.* A further RSV vaccine is likely to become available in the near future. No vaccines against mycoplasmas are commercially available. Advice on whether or not the use of vaccines in a particular situation is likely to be beneficial should be obtained from your veterinary surgeon and will necessitate consideration of factors such as the severity of the problem, the age groups affected and the main organisms likely to be involved.

Overall, variable results appear to be obtained on different farms using currently available vaccines, particularly in younger age groups of calves. Reasons for this may include the range of organisms which can be involved in outbreaks and possible interference by maternal antibodies with vaccine 'take' in some calves. Further research and development is necessary in the field of vaccination against calf pneumonia. It is also necessary to give the immune system every chance to mount a good response by ensuring good standards of nutrition and eliminating any major vitamin or trace element deficiencies.

PASTEURELLA PNEUMONIA IN SUCKLER CALVES ('TRANSIT FEVER')

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The bovine mortality survey identified pneumonia as the most important cause of deaths in 1-5 month and 6-24 month old cattle. A previous article in this series described enzootic calf pneumonia ('virus pneumonia'). However, an additional problem is acute *Pasteurella* pneumonia in suckler calves. This occurs most frequently in recently weaned and newly housed single suckled calves. The disease has a seasonal incidence and is most common from September to November, when most calves are weaned and when most of the suckler calf sales take place.

CAUSE OF DISEASE

The lung damage in this pneumonia is caused by the bacterium *Pasteurella haemolytica*. A particular strain of this organism (A1) is the one most frequently involved in outbreaks. An important factor in enabling *Pasteurella haemolytica* A1 to cause severe pneumonia is the ability of this organism, when multiplying rapidly, to produce a powerful toxin. This toxin can overcome the normal protective anti-bacterial defences of the respiratory tract, allowing large numbers of *Pasteurella* organisms to invade the lungs and cause disease.

However a critical factor in the development of *Pasteurella* pneumonia is the severe 'stress' which is often imposed on suckled calves around the time of weaning. Stress factors include separation from the dam, transportation to and from markets and especially trading through a number of markets, mixing with other calves at market, dietary change, change from an outdoor to an indoor environment and sometimes dehorning and castration. Small numbers of *Pasteurella haemolytica* A1 are normally present in the respiratory tract of some calves. Under conditions of severe stress, rapid multiplication of these organisms can occur, leading to spread of infection to susceptible comrades and development of disease in the group.

In some cases, infection with respiratory viruses may also act as a predisposing factor. However, virtually all of the lung damage in *Pasteurella* pneumonia is inflicted by *Pasteurella haemolytica* and viruses would appear to have a lesser role in this disease than they do in the more common enzootic calf pneumonia.

CLINICAL SIGNS

Disease usually develops within three weeks of animals being housed. Usually only a relatively small proportion (often around 10%) of a group is severely affected. However deaths can, and frequently do, occur. The main clinical signs include: dullness with affected animals often standing alone, loss of appetite, increased respiratory rate ('blowing') and high temperature. A slight nasal discharge may also be present.

DIAGNOSIS

Pasteurella pneumonia can be diagnosed by your veterinary surgeon on the basis of clinical signs and the history of the outbreak. If deaths occur, post-mortem examination, including bacteriological examination of lung tissue, is useful in confirming diagnosis and in establishing antibiotic sensitivity patterns of the *Pasteurella haemolytica* organisms involved. Veterinary examination is also very important in differentiating *Pasteurella* pneumonia from other respiratory conditions, and in particular infectious bovine rhinotracheitis (IBR), which can also be an important problem in recently purchased fattening cattle. It is important to differentiate these two conditions as there are differences in approaches to control.

TREATMENT

When disease occurs it is essential to ensure prompt veterinary treatment. Where diagnosis is made at an early stage and appropriate antibiotic treatment instituted, many cases will make a good recovery. Lung damage caused by *Pasteurella* can, however, progress very quickly. If there is a delay in seeking veterinary attention possibly as a result of a 'do-it-yourself' approach, not only can unnecessary deaths occur but survivors may be left with multiple lung abscesses. A range of broad spectrum antibiotic drugs with activity against *Pasteurella* is available. The choice of treatment regime is best left to your veterinary surgeon.

CONTROL

At present there is no foolproof method of preventing *Pasteurella* pneumonia. However, steps can be taken to reduce the incidence and severity of outbreaks and the associated economic loss and animal suffering.

It is very important to be aware of the likelihood of this disease in recently weaned and newly housed suckled calves and realise that it is most likely to strike within the first three weeks of housing. Therefore, farmers should be particularly vigilant during this period and veterinary attention should be sought immediately signs of pneumonia are observed.

Management measures aimed at reducing the stresses to which calves are exposed during this period will be helpful, although the opportunities for manoeuvre are often limited. Transportation times should be kept to a minimum and transport conditions should be made as comfortable as possible for the calves. Any opportunity for direct purchase of calves should be utilised. If purchased animals can be kept outside for a period of a few weeks (space and weather permitting) before being housed, then the incidence and severity of the disease should be reduced. It is important that once indoors, the cattle are not overcrowded and that houses are well-ventilated.

There are vaccines currently on the market which are designed to give protection against disease caused by *Pasteurella* in cattle. However, results achieved by their use are variable and overall they have not achieved effective prevention of disease. Recent research has been aimed at developing vaccines which will induce effective protection not only against the bacterium itself but also against the important toxin which it produces. Development of such vaccines will be a major step on the road to prevention.

BOVINE VIRAL DIARRHOEA/MUCOSAL DISEASE

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Mucosal disease and bovine viral diarrhoea are the most common diseases resulting from infection with the bovine viral diarrhoea/mucosal disease virus(BVD/MD virus). Infections with BVD/MD virus are common in Northern Ireland and, indeed, worldwide. While the majority of these infections produce no visible signs of illness (subclinical infections), on occasions the virus is capable of producing disease and, in particular, a fatal condition called mucosal disease. The importance of BVD/MD virus as a major cattle pathogen in Northern Ireland was highlighted in the recent bovine mortality survey where mucosal disease was estimated to be responsible for 10% of deaths in cattle aged 1-5 months and for 7% of deaths in cattle aged 6-24 months.

ROUTES OF INFECTION AND VIRUS SPREAD

In a normal healthy bovine, infection with BVD/MD virus is usually followed by a rapid immune response, resulting in elimination of virus and production of antibodies in the bloodstream. If, however, an in-calf cow becomes infected with the virus for the first time the virus can cross the placenta and infect the foetus. The immune system of the foetus does not develop until it is approximately 180 days old and if infection occurs before this time the calf, if it survives to birth, will be born with BVD/MD virus infection continuously circulating in the bloodstream and present in all major body organs. This is called a persistent infection.

Such persistently infected animals continuously shed virus in discharges from the nose and in saliva, faeces, urine, milk or semen. Persistently infected calves do not develop an immune response to BVD/MD virus. At birth, persistently infected animals may appear normal and may even survive to adulthood without showing any outward sign of infection. Others, however, may be born weak, unable to stand or inco-ordinated, blind, or smaller than usual. Some of these may recover with nursing and attention but others will die. Other possible results of foetal infection include abortion, mummification and stillbirth.

Persistently infected animals are the major source of infection for other cattle. Housing or other circumstances bringing animals into close contact, facilitates spread of infection. The use of semen and milk from persistently infected animals can result in virus spread. Other possible routes/sources of infection also exist. For instance, sheep are susceptible to BVD/MD virus infection and on occasions may introduce or spread infection to cattle.

Outcome for persistently infected animals

Around 1-2% of cattle on a national basis are estimated to be persistently infected and there are three possible outcomes for these animals:

- **Normality**. Some persistently infected animals can grow and mature normally without suffering any ill-effects. Females may breed and milk normally, although their calves will also be persistently infected, thereby creating a maternal line of persistently infected animals.

- **Development of acute mucosal disease**. This is a sudden onset disease with death usually occurring 2-6 days later. The clinical signs of acute mucosal disease include salivation, watery and sometimes bloody scour, the development of ulcers throughout the digestive tract and loss of appetite. In the live animal, ulcers may be seen on the lips and inside the mouth. Animals may also become lame due to the development of ulcers in the space between the hooves.

- **Development of chronic mucosal disease**. Some mucosal disease cases do not die immediately, rather they suffer from intermittent bouts of scour, fever and loss of appetite with progressive emaciation and ultimate death. These animals have ulcers in the mouth and in the remainder of the digestive tract. They may also show lesions on the skin especially around the anus, vulva or scrotum, insides of the legs and the spaces between the hooves.

Mucosal disease is most commonly seen in animals aged 6-24 months but can also occur in younger and older animals. Mucosal disease can only occur in animals which are persistently infected.

Other diseases/conditions associated with BVD/MD virus infection

As well as having the ability to cause mucosal disease in animals which were initially infected in the womb, BVD/MD virus can also produce or predispose to a range of diseases in cattle infected in postnatal life. These include:

- **Bovine viral diarrhoea**. This is the name given to a disease which occasionally can arise following infection of healthy cattle with BVD/MD virus. In its most severe form, affected animals can develop mouth ulcers and severe scour, which in some cases can have a fatal outcome. Some outbreaks of bovine viral diarrhoea have occurred in adult cows.

- **Suppression of the immune system**. By attacking the animal's immune system BVD/MD virus can reduce the ability to fight off other infectious agents. In this way, infection with some strains of BVD/MD virus may on occasions act as a predisposing factor to outbreaks of other diseases such as pneumonia or salmonellosis.

- **Fertility problems**. Infection with BVD/MD virus around the time of service, by infected semen or otherwise, may result in a decreased conception rate, increased returns to service and increased services per conception.

DIAGNOSIS

Mucosal disease can be strongly suspected on clinical examination by a veterinary surgeon and at post-mortem examination based on characteristic ulceration of the digestive tract. Confirmation of diagnosis depends on the isolation of BVD/MD virus from a suspected case. In the live animal blood samples are suitable for virus isolation. In other diseases/conditions where infection with BVD/MD is suspected, testing for the presence of a rising level of viral antibody in blood samples can usefully be performed. Your veterinary surgeon can best advise on what samples are most appropriate for laboratory examination in the light of circumstances pertaining on individual farms.

TREATMENT

Unfortunately, animals suffering from mucosal disease die and there is no effective treatment available for clinical cases. Other conditions associated with BVD/MD virus infection should be treated on the basis of symptoms. For instance, oral or intravenous fluid therapy can be given in cases of bovine viral diarrhoea. Antibiotics can be used to control secondary bacterial infections resulting from the immunosupression caused by some BVD/MD virus infections. Treatment always should be under the guidance of your veterinary surgeon.

CONTROL/ERADICATION OF MUCOSAL DISEASE

Control/eradication of BVD/MD virus infection at farm level is possible in closed herds. However, this will involve a long-term commitment on the part of the farmer and should not be undertaken lightly.

It has been estimated that 75% of losses associated with BVD/MD virus infection occur as a result of foetal infection in the womb and therefore prevention of infection at this stage must be given a high priority in any control programme. Some persistently infected animals can be readily traced by testing the dams of cattle which have died from mucosal disease. Obviously, this will depend on the availability of accurate records to allow tracing of the dams. However, detection of all persistently infected animals requires detailed testing of all animals in a herd. Once these animals have been identified and removed the aim is then to prevent reintroduction of the virus and this involves the maintenance of a high standard of bio-security. A potential problem with this approach, however, is that over a period of several years, all immunity to BVD/MD virus within the herd will wane. If the virus was then to be inadvertently reintroduced into the herd the potential for widespread and severe BVD/MD virus associated disease to occur exists. This could be financially disastrous should it happen.

An alternative approach, following the identification of all persistently infected animals, is to retain one of these in the herd and use it as a vaccinator animal. All heifers can be exposed to this animal prior to service, thereby ensuring they have immunity before pregnancy. This greatly reduces, but does not totally eliminate, the chances of their calves becoming infected in the womb. Since this approach maintains BVD/MD virus immunity within the herd, the risks associated with natural infection are very much reduced. **However, persistently infected animals must be kept separate from pregnant cows and heifers**.

Although vaccines against BVD/MD virus do exist, little information is available concerning their ability to prevent foetal infections occurring. Consequently, to date, these have not been licensed for use in United Kingdom.

The advice of your veterinary surgeon is essential in considering the feasibility and implementation of a control programme for BVD/MD virus-associated disease, if such a problem exists on your farm.

Postscript:

Since the time of writing, inactivated BVDV vaccines designed to prevent transplacental transmission of the virus to the foetus have been licensed for use in the UK. The Diagnostic Unit of the Veterinary Sciences Division offers a range of tests for BVDV, including testing of bulk tank milk (BTM) for antibodies. This BTM test gives an indication of how many of the milking cows have been exposed to the virus. This test may be used to monitor herds to detect introduction of infection or to determine the likelihood of persistently infected animals being present on a farm.

BLACKLEG

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Blackleg is an important cause of bovine mortality in Northern Ireland. The disease is normally seen in animals between six months and two years of age. The bovine mortality survey, conducted recently by Veterinary Sciences Division, has estimated that blackleg accounts for approximately 5% of deaths within this age group.

Blackleg tends to be more common during the summer months but occasional outbreaks have occurred in housed animals. Affected animals are usually in good condition and frequently on a high plane of nutrition.

Some farms have recurring cases of the disease while on others the condition occurs only occasionally. A single animal is affected in many cases but outbreaks involving groups of animals are also common.

EPIDEMIOLOGY

True blackleg is a bacterial disease caused by *Clostridium chauvoei*. Other Clostridial species, notably *Clostridium septicum* and *Clostridium novyi* may also be involved in some cases, although the disease produced by these organisms is more commonly referred to as 'gas gangrene' or 'false blackleg'. This latter condition is usually the result of entry of infection via wounds.

Clostridium chauvoei is present in soil and it is thought that the organism gains entry to the body through the digestive tract. Following ingestion, the organism can lie dormant in the gut and also in tissues such as liver and spleen. The factors which allow the organism to start multiplying and cause blackleg are unknown. Toxin produced during this proliferation stage results in muscle damage locally and also causes a general toxaemia which is usually fatal to the animal.

Recontamination of the soil with *Clostridium chauvoei* occurs through the faeces from infected animals or from the decomposition of carcases of animals which have died from the disease and have been improperly buried.

CLINICAL SIGNS

In many cases the disease is so acute that it results in the sudden death of the animal. In animals which are seen alive, there is a severe lameness normally affecting the upper part of the leg. In the initial stages, the affected area is swollen and painful and may give the impression of air being trapped under the skin when it is touched. The animal is severely depressed, off its food and usually has a high temperature.

DIAGNOSIS

Involvement of your veterinary surgeon is essential in diagnosing the condition both in the live animal and in cases which present as sudden death. Where the animal has died, your veterinary surgeon may carry out a post-mortem examination or recommend submission of the animal to a laboratory for a full laboratory investigation. It is, however, important in all cases of sudden death in cattle to exclude Anthrax as a possible cause of death and all such cases should be reported to your local Divisional Veterinary Office to allow examination for Anthrax to be carried out before the carcase can be disposed of or a post-mortem performed.

TREATMENT/CONTROL

Frequently, the condition is too far advanced for treatment to be effective but in early cases intravenous treatment with antibiotics by your veterinary surgeon may be effective.

A range of vaccines is available which normally give effective control of the disease. The primary course of vaccination requires two doses usually 4-6 weeks apart with six monthly or yearly booster doses, depending on the type of vaccine used. Protective immunity is not fully developed until after the second dose of the initial vaccination course.

Where an animal is affected, vaccination of the remainder of the group and/or removal from the particular pasture is normally recommended. Due to the time taken to develop immunity following vaccination, your veterinary surgeon may also recommend treatment of the rest of the group with long acting antibiotics to give protection during this period.

CONCLUSIONS

If blackleg is known to have occurred on your farm (including any land taken as conacre), ensure that your young stock are vaccinated. Your veterinary surgeon can advise you on the most appropriate vaccination regime for your herd.

Veterinary Sciences Division

Reducing cattle deaths