



FINAL REPORT

**MANAGING GRASSLAND ON FARMS AFFECTED  
BY FOOT AND MOUTH**

Prepared for MAFF Working Group

A MAFF CSG Livestock Initiative

Institute of Grassland and Environmental Research

and

ADAS

May 2001

## MANAGING GRASSLAND ON FARMS AFFECTED BY FOOT AND MOUTH

Prepared by IGER and ADAS : May 2001

Project Leaders: Raymond Jones (IGER Forage Conservation and Utilisation)  
Bryan Evans (IGER Grassland Technology Transfer)

Authors:

Deborah Courtney (IGER)	Christina Marley (IGER)
Dave Chadwick (IGER)	Heather McCalman (IGER)
Dennis Chapple (ADAS)	Barbara Mclean (ADAS)
Chris Duller (IGER)	Clare Middlemass (Newton Rigg)
Bryan Evans (IGER)	Charles Minter (Newton Rigg)
Rhun Fychan (IGER)	Charlie Morgan (IGER)
Raymond Jones (IGER)	Jerry Tallowin (IGER)

Management Team:

Arthur Davies (IGER)  
Bryan Evans (IGER)  
Steve Jarvis (IGER)  
Raymond Jones (IGER)  
Brian Merrell (ADAS)  
Charles Minter (Newton Rigg)  
Mike Theodorou (IGER)

This document outlines some of the main issues of grassland and forage cropping that are likely to arise on farms affected by the Foot and Mouth epidemic.

# MANAGING GRASSLAND ON FARMS AFFECTED BY FOOT AND MOUTH

## CONTENTS

<b>General Grassland Guidelines</b>	.... 5
<b>Section 1: De-stocked Farms</b>	.... 7
Conservation	
Sward maintenance	
Weed control	
Marginal areas	
The use of fertilisers	
Alternative enterprises	
<b>Section 2: Understocked Farms</b>	.... 10
Management of undergrazed swards	
The use of fertilisers	
Grazing	
Topping	
<b>Section 3: Overstocked Farms</b>	.... 12
Priorities	
Grassland	
Livestock performance	
Weed control	
<b>Section 4: New Grassland Options</b>	.... 15
Reseeding	
Sward renovation	
Changing systems	
Alternative forage crops	
Clover based systems	
Organic Conversion	
Extended grazing systems	
Agri-environment	
Alternative enterprises	
<b>Section 5: Conservation</b>	.... 19
Methods of conservation	
Silage crop management	
Farm services	
Other options	
<b>Section 6: Housed Livestock</b>	.... 22
Forage available	
No forage available	
Zero-grazing	
Housing	
<b>Section 7: Alternative Forage Crops</b>	.... 25

## **MANAGING GRASSLAND ON FARMS AFFECTED BY FOOT AND MOUTH**

<b>Section 8: Organic Farming</b>	<b>.... 28</b>
<b>Section 9: Agri-Environment Options</b>	<b>.... 30</b>
Entry to an Agri-environment scheme	
Stockless or understocked Farms	
<b>Section 10: Manure Management</b>	<b>.... 31</b>
Manure storage	
Manure treatment	
Manure application	
Effect on grassland management	

## MANAGING GRASSLAND ON FARMS AFFECTED BY FOOT AND MOUTH

Prepared by IGER and ADAS May 2001

This document outlines some of the main issues of grassland and forage cropping that are likely to arise on farms affected by the Foot and Mouth epidemic. The guidelines to management have been considered to be relevant to the following categories of farm:

1. De-stocked farms (as a consequence of outbreak, contiguous cull or dangerous contact)
2. Housed stock (as a consequence of MAFF recommendations)
3. Under-stocked farms (as a consequence of movement restrictions)
4. Over-stocked farms (as a consequence of movement restrictions)

In addition to grassland and associated livestock issues, animal welfare considerations and alternative land use/organic options have been addressed.

MAFF Divisional Veterinary managers have been consulted in the preparation of this report and their guidance is printed in *italics* within relevant sections.

The recommendations, which are of a technical nature, are offered together with the general and overriding advice that farm business implications will frequently arise and should be subject to further farm business appraisal.

### Force majeure

*If your animals are compulsorily slaughtered during a scheme retention period because they are infected with FMD, as dangerous contacts, or because they have been exposed to infection, eg on contiguous farms, you can expect the force majeure rules to apply. This means that any subsidy claim submitted on or before 21 February 2001 – and which is otherwise satisfactory and supported by quota – will be met. This applies to sheep annual premium and suckler cow premium claims, to beef special premium claims for 2000, and to beef special premium claims submitted by 21 February. (For later beef special premium claims see below.) As an exception to the normal force majeure rules, we will try to pick up all the information we need from internal records. However, it would help to safeguard your position if you notify us in the usual way within ten days.*

*Force majeure rules usually only apply if the circumstances were unforeseeable. Whether they will apply to animals slaughtered during a retention period which started after FMD was diagnosed on 21 February, eg claims under the beef special premium 2001, will depend on the particular circumstances. A producer who claimed BSP one day and submitted an application under the Livestock Welfare Disposal Scheme the next, would not be eligible for Force majeure. At the other extreme, a producer in an area remote from the original sites of infection who submitted a claim in late February and was only infected towards the end of the two-month retention period, would have a better claim. To safeguard your position, please notify your RSC within ten days of realising that you cannot meet the BSP rules.*

## GENERAL GRASSLAND GUIDELINES

This guide outlines a number of grassland management recommendations that are referred to throughout the document.

### Sward Surface Height (SSH) Guidelines

The following three tables are for leys or permanent grass which have a good representation of agricultural grasses (a minimum of 40% sown species).

*All figures are based on measurements recorded using HFRO sward stick. If a plate meter is being used for measurements, increase all heights by 1cm.*

**Table 1. Dairy Cows**

Livestock Type	Graze Period	Rotational Pre-graze cm	Rotational Post-graze cm	Rotation * Interval days	Continuous cm	Notes
Lactating	Turn-out-May	10-15	<b>6-7</b>	16-20	6-7	Top to 5 cm if SSH is exceeded
	June-July	12-15	<b>7-8</b>	20-24	7-8	Swards above target SSH in May should be topped by early June
	Aug-Sept	12-18	<b>8-9</b>	24-28	8-9	
	Oct-House	12-15	<b>6-7</b>	Variable	6-7	All early/mid lactation cows will need supplement at this time
Dry cows		NA	<b>4-5</b>		4-5	Note condition score

\* Rotation interval given as a guide only, they may need to be varied. **Post-graze SSH is the primary decision driver.** Pre-graze Sward Surface Height and Rotation Interval give information to assess 'paddock skipping' and 'buffer grazing' in forward planning of grazing area.

**Table 2. Beef Cattle**

Livestock Type Suckler Cows	Graze Period	Grazing after rest on un-adapted sward		Continuous cm	Notes
		Pre-graze cm	Post-graze cm		
Lactating	T'out-May	10-14	<b>5-6</b>	5-6	
	June-July	12-15	<b>6-8</b>	7-8	
	Aug-Nov			7-9	Graze to 5cm with dry stock Nov/Dec
Dry				4	Note condition. Increase to 5-6cm for thin cows; restrict grazing for fat cows
<b>Growing/ Finishing Cattle</b>	T'out-May	10-12	<b>5-6</b>	5-6	Increase by 1-2cm for finishing cattle
	June-July	10-14	<b>6-7cm</b>	6-7 cm	SSHs should be gradually increasing

**Table 3. Sheep**

Livestock Type	Grazing Period	Grazing after rest on un-adapted sward		Continuous cm	Notes
		Pre-graze cm	Post-graze cm		
Ewes and lambs	T'out-April	8-10	4-5	4	Feed until 4+ gradual increase if possible
	May-wean	8-10	4-6	4-6	
Dry Ewes	July-Aug			3	Reduce to 6cm for Condition Score >3
Pre-tupping	Sept-Nov	8-10	4-5	6-8	gradual increase
Weaned lamb for finish	July-Sept	10-12	5-7	6-8	
Store lambs	July-Start of finishing period	NA		4	

### Target condition scores

Target condition scores for livestock will vary between breeds and season of breeding, but the following is a guide for normal production:

**Table 4. Target Condition Scores**

Sucklers		Ewes		Dairy cows	
Mating	2.5 – 3	Tupping	3 – 3.5	Lactating	2.5-3
Calving	2.5 - 3	Pregnancy	3 - 3.5	Dry cows	3.0-3.5
Weaning	3 – 3.5	Weaning	2 –2.5		

### Grass response to Nitrogen fertiliser

On understocked farms, grass growth can be reduced over the season by reducing N application, enabling quality of swards to be maintained at lower stocking rates. On overstocked farms, N application can be increased to increase grass growth, maintaining maximum levels of N utilisation and seasonal variation.

**Table 5. Potential yields (t DM/ha) at a range of nitrogen fertiliser levels**

Kg N/ha	50	100	150	200	250	300
Site class						
Fair	3.3	4.6	5.9	7.2	8.2	9.1
Average	3.8	5.1	6.4	7.7	8.7	9.6
Good	4.2	5.6	7.0	8.3	9.4	10.3

Optimum N applications should not be exceeded, refer to MAFF Fertiliser Recommendations RB209, 2001

As a rule of thumb, in a grass sward, 20-30 kg of grass DM is produced for each kg of N fertiliser applied - up to additions of 300kg N/ha/year.

A good grass/white clover sward will produce the equivalent of grass+150-200kgN/ha.

## **SECTION 1: DE-STOCKED FARMS**

This section deals with grassland that has been de-stocked as a result of F&M, or is unavailable for grazing because of livestock movement restrictions. Alternative uses for this land, including its redevelopment for possible changes in farm policy, are described in Section 4. Where these are not applicable, methods of maintaining the sward for restocking are described.

### **1.1 Forage Conservation**

Many de-stocked farms will be considering conserving grass for winter forage for new stock or for sale. The date at which harvesting, conserving, feeding, moving and selling of conserved fodder on de-stocked farms can occur, will be determined by regulations and will need to be checked for each individual farm.

Management of grassland for environmental objectives where the farm has been de-stocked will be covered in Section 9.

### **1.2 Sward maintenance**

De-stocked farms may be unable to make conservation cuts, either because of restrictions placed on the farm, or because the land is unsuitable for conservation. If these areas of grassland are allowed to grow unchecked for a whole growing season, the quality and longevity of the sward may be reduced.

Where possible, this grassland should be managed by regular topping to prevent the accumulation of decaying vegetation which can reduce plant and tiller numbers and lead to a very open sward and invasion of weed species.

- Decisions on when to top should be driven by the need to prevent any large amounts of cut grass lying in swaths and smothering out the grass beneath.
- If topping is delayed, any build up of cut material should be spread or removed by raking.
- Ground that received fertiliser before stock disposal could require several 'toppings' during peak grass growth in May-July.
- On unfertilised or less fertile land, topping in May, mid and late summer may be sufficient for herbage and weed suppression.
- Mid-summer topping for sward conditioning will be particularly important to those producers able to re-stock later in the summer or autumn.
- It is important to remove any accumulation of grass before entering the winter period as the presence of too much leafy material can lead to high levels of frost damage and winter kill.
- Swards dominated by non-sown species such as bents and meadow grasses will be less prone to deterioration than ryegrass swards and can be viewed as a lower priority.
- Clover is particularly intolerant of shade. To maintain a high clover content in the sward it is important to top regularly during the peak grass growing period (May-late

June). During the summer, clover growth rates rise and allow clover to compete more effectively with grass and topping frequency can be reduced.

- When topping red clover leys, the cut should not be below 6cm to avoid damaging the growing points and killing plants.

### **1.2.1 Weed control**

In the absence of grazing animals, there are likely to be higher numbers of weeds reaching maturity. Grassland should be managed to prevent the potential spread and increase of weeds such as ragwort, docks, nettles and thistles. This can be achieved by herbicides or by topping *before* the weed plants flower and set seed. Repeated topping will give some reduction in weed infestation.

Where regular topping is not desirable through the season, land could be ploughed and left in fallow. With the use of chemicals, this could be an opportunity to control weed numbers before reseeding.

### **1.2.2 Marginal areas**

In areas where access with machinery is not an option, due to steep gradients or soil conditions, there is little that can be done to prevent the build up of herbage. When restocking is allowed, it is important that these areas are grazed as soon as possible and that accumulated herbage is grazed down to a low level before winter.

### **1.2.3 The use of fertilisers**

Use of Nitrogen fertiliser on land where there is no demand for increased grass growth for grazing or harvesting is unnecessary. When cut grass is removed following topping, it is important that allowance for the removal of phosphate ( $P_2O_5$ ) and potash ( $K_2O$ ) is considered in autumn applications if next year's spring growth is not to be compromised. For every tonne of dry matter removed, 7kg of phosphate and 24kg of potash will be lost from the system.

If soils are potash deficient, it is important that any applications are made this autumn rather than next spring - especially if there is a history of grass staggers. Green manures can be used as a way to build soil fertility – by ploughing in a grass or cover crop. This could also be used in conjunction with a summer reseeding plan.

*MAFF advice to arable farms on movement of machinery may also be relevant to grassland machinery for section 1.1 and 1.2. 'existing advice to farmers under Form A restrictions is that they can access and work their adjacent arable land but plans need to take account, not only of restrictions on the ultimate movement of things off a Form A premises while restrictions are still in force, but also to keep arable equipment, once cleaned and disinfected and removed from the farmyard, away from the activity attendant upon major cleansing and disinfection of the livestock accommodations.'*

## **1.3 Alternative enterprises**

If your farm is suitable to incorporate alternative enterprises during the period of destocking, some of the following may be considered:-

Alternative crops - a range of summer and winter crops are addressed in Section 7.

Organic Conversion - the period without stock and inputs to the land could count as part of a conversion period. See Section 4 and 8 for further information.

Horse industry - there may be the opportunity to let land for horse grazing, or for the production of haylage for horse feed. Refer to Section 5 for information on forage conservation.

Poultry - using land for free range chickens or producing geese/ducks for the Christmas market are possibilities if marketing routes can be identified.

Turf production - where there are no immediate plans to restock there may be opportunity to grow turf for commercial purposes. Soil requirements are fairly specific - further information is available from the Turfgrass Growers Association (Tel/Fax: 01728 723672) or at [www.turfgrass.co.uk](http://www.turfgrass.co.uk).

*MAFF specific advice on alternative enterprises are:*

*Horses: Although horses do not contract FMD, they and their attendants can still act as mechanical carriers of virus-contaminated organic matter and we restrict their access and (especially) exit from Form A premises while restrictions are still in force on that premises.*

*Poultry: Present rules allow poultry carcasses off a Form A premises but live poultry must await the lifting of the restrictions.'*

*Turf production: Turf from a field which contained FMD-susceptible livestock could carry some virus for a few months. If restocking with animals is carried out 21 days after cleansing and disinfection have been completed, then after monitoring for approx. 6 weeks, all Form A restrictions may be lifted, HOWEVER at present the rules upon land NOT restocked, would extend the restrictions for 4 months.*

## **SECTION 2: UNDERSTOCKED FARMS**

Disruption to normal livestock movement or sale will result in some farms having fewer livestock during this growing season. These farms may also have opportunities for alternative land use or for redevelopment described in Section 4. In some cases the land may be suitable to provide forage for conservation - see Section 5 for more information.

Land not suitable for such options will need to be managed at lower stocking rates. The *General Grassland Guidelines* provide recommendations for sward grazing height and information on fertiliser nitrogen response which can be used to manage grass supply in this situation.

With lower stocking rates it is probable that grass growth will exceed demand. This will have consequences to the growth of the animals, their health and welfare and to the condition of the swards. There may be the opportunity to increase the area used for conservation (see Section 5) to build up feed stocks for winter or for sale. The farm status could impose restrictions and should be checked with MAFF/NAWAD.

### **2.1 Management of undergrazed swards**

#### **2.1.1 The use of fertilisers**

Reducing normal fertiliser inputs will mean less risk of undergrazing taking place. This will be the main response on farms where conservation or an alternative land use is not possible on surplus grazing areas. Table 5 in *General Grassland Guidelines* can be used to estimate grass production in relation to nitrogen fertiliser use. As a general guide, for every 1 dairy cow, 2 store cattle or 5 ewe+lamb per ha removed from the 'grazing' stocking rate, it will be possible to reduce annual nitrogen applications by 150 kgN/ha. The rate and timing of any fertiliser applications can be adjusted according to grass supply.

Changing to a less intensive livestock system or to organic farming may be considered. More information can be found in Section 4, under new grassland options.

### **2.2 Grazing**

- The area used for grazing should be determined by sward height (See Tables 1, 2 and 3 in *General Grazing Guidelines*). This may be more easily achieved with rotational grazing where fields can be taken in, or left out of each grazing circuit depending on grass supply. Continuous grazing remains acceptable, providing that grass availability is controlled by fertiliser use and the area used for grazing.
- A 'leader-follower' system of grazing could be adopted where some classes of stock need high grass intakes and others require lower intakes. For example, lower intakes for cattle which need to be held in 'store' condition or to prevent young heifers becoming over fat.

### 2.2.1 Grazing clover

- If red clover silage leys have to be grazed, continuous and close grazing should be avoided. Use rotational grazing - graze for up to 1 week, followed by a rest period of 2-3 weeks in early summer, or up to 4 weeks in late summer.
- If continuous grazing is unavoidable, the stocking rate should be gradually increased so that the plant can adapt its growth habit to the grazing pressure.
- Grazing red clover through the winter period should be avoided as should grazing with ewes for six weeks before and after tugging.
- When grazing red and white clover-rich swards, care must be taken to avoid the risk of bloat. Hungry stock should not be put into clover rich fields, daily fluctuations in quality and quantity of feed should be avoided, clover should be gradually introduced into the diet, close supervision taken until the stock are settled and care taken on damp, cold mornings.

### 2.3 Topping

Swards will become stemmy and lose quality very rapidly if they are undergrazed. Topping of swards through the season will reduce the volume of herbage and help to stimulate new growth which will be of higher quality. Topping should be aimed down to a level just **below** the levelled grazed (See Tables 1, 2 and 3 in General Grazing Guidelines).

- The base of the sward will become open if grass is allowed to build up through the season. This will reduce its grazing potential next year and also provide an opportunity for the growth and spread of weeds.
- Decisions on when to top should be driven by the need to prevent any large amounts of cut grass lying in swaths and smothering out the grass beneath. Topping in this way will offer a return of some nutrients to the soil. This will be of advantage to organic farmers under restriction for manure application.
- If topping is delayed, any build up of cut material should be spread or removed by raking.
- Ground that received fertiliser before stock disposal could require several 'toppings' during peak grass growth in May-July.
- On unfertilised and less fertile land topping in May, mid and late summer may be sufficient for herbage and weed suppression. Mid-summer topping for sward conditioning will be particularly important to those producers able to re stock later in the summer or autumn.
- Early topping will prevent the accumulation of large amounts of vegetation and stimulate new tillers and a leafy sward.
- Topping stemmy swards in early season will help reduce problems of foot scald in sheep.
- Clover is particularly intolerant of shade. To maintain a high clover content in the sward it is important to top regularly during the peak grass growth period (May-July). During the summer clover growth rates rise and allow clover to compete more effectively with grass so topping frequency can be reduced.
- When topping red clover leys, cutting should not be below 6 cm to avoid damaging the growing points and killing plants.

## **SECTION 3: OVERSTOCKED FARMS**

On many farms restrictions to normal livestock movements and sales will result in higher stock numbers and/or less grazing land available. Livestock feeding and welfare during the grazing season, and provision of forage for next winter, will be key issues.

### **3.1 Priorities**

It will be necessary to develop a strategy for each farm with respect to the available grassland and livestock needs for the best economic return, balancing short-term cash-flow impacts and long term production and business performance. This strategy will need to consider-

- a) The implications to claims for livestock and crop subsidies, Extensification and other Agri-environment schemes
- b) Compensating for reduced grassland area by increased fertiliser use
- c) Other options, including
  - House animals (some or all), the availability and cost of alternative feeds
  - Zero-graze - refer to Section 6
  - Graze all areas, reducing or having no conservation area - assess cost of purchase forage for the winter.
  - Modify livestock production targets - e.g. finish singles early for income and to release area later for ewes with twins; dry off dairy cows earlier; finish forward cattle indoors; graze cattle for 'store' rather than finished sale
  - Consider other forage crops for late summer or winter use. See Section 7.
  - Consider availability of land or crops for lease, purchase or other agreement in the area

### **3.2 Grassland**

Some farms will have the opportunity to increase grass production by increased fertiliser use, providing soil pH, phosphate and potash levels are satisfactory. Table 5 in General Grassland Guidelines displays expected grass yields over a range of nitrogen fertiliser inputs.

An increase of 150kg N/ha during the season (up to the maximum levels, MAFF Fertiliser Recommendations RB209, 2001) will produce sufficient herbage for grazing 1 dairy cow, 2 store cattle or 5 ewes+lamb per grazing hectare.

Additional nitrogen fertiliser should be applied monthly at 40-60kg N/ha depending on actual stocking rate.

- New or young leys will yield 10-20% more than older leys.
- Grazing below 4 cm will delay and reduce sward recovery. Where very high grazing pressures are restricting grass intakes, rotational grazing will provide better daily intake control and growth recovery than continuous grazing. Zero grazing -

discussed in Section 6 - is also an effective way of rationing limited herbage without compromising grass growth recovery.

- It will be too late for reseeding to contribute extra production in this grazing season but if some swards have to be sacrificed by very heavy grazing, select fields with the poorest swards to be reseeded in the late summer. These fields could be reseeded or sown to other forage crops to extend next year's grazing season by an earlier turnout.
- Higher use of nitrogen fertiliser may reduce the clover content of swards. This effect can be offset by following sward height guidelines in Tables 1-3 (in General Grazing Guidelines) and by allowing periods of rest in the mid- late summer.
- Where clover swards are key to the farming system then management for clover will be important. Protecting the red clover growing point by not grazing too low, and resting white clover to allow recovery are important to their survival in the sward. Refer to Section 4 on the management of clover based systems.

### **3.3 Livestock performance**

Livestock performance levels can be met where the sward height guidelines are maintained. Swards grazed below these levels will result in lower performance unless supplements are fed. Swards grazed below 4 cm by cattle or 2 cm by sheep will compromise livestock welfare and stock will require feed supplementation.

- Where sward heights are just below recommended levels, supplements needed for higher performance should be high energy feeds (cereal or sugar beet based).
- Where intake is substantially reduced on very short swards, more fibrous bulky feeds will be needed (silage, hay, straw). Supplements to these bulky feeds will depend on livestock type and performance level required.
- Animal Condition Scoring is recommended as a basis for monitoring livestock performance at grass, particularly where liveweight or milk yield records don't apply. Target condition score for livestock type will vary between breeds and season of breeding, e.g. spring or autumn calving, hill and down sheep breeds, but a guide for normal production can be found in Table 4 in General Grazing Guidelines.
- In organic systems, where additional supplementation is needed, available organic supplementary feed should be fed to milking dairy cows and finishing stock as a priority over breeding and store stock. The relevant Certification Body should be consulted.
- Other health and welfare consequences of higher stocking rates may include worm burden and infectious diseases, e.g. Coccidiosis, footrot. Normal 'clean' or 'safe' grazing systems may be disrupted. Flock and herd health plans should be adjusted for the change in circumstances and veterinary advice may be needed. Consideration of livestock types, mixed grazing, rotational grazing, e.g. leader-follower systems, and faecal egg counting are techniques which can help to manage these issues.
- Organic producers will also need to contact their Certification Body if there is a potential to depart from agreed animal health plans and where derogation to use restricted products may arise.
- If there is a need to graze fields previously set up for silage with slurry and potash fertilisers, precautions should be taken to minimise the risk of Grass Staggers and magnesium supplementation may be needed. The provision of low potash buffer

feeds such as straw or maize to dilute the potassium content of the diet will also help to reduce this risk.

### **3.4 Weed control**

- Overstocking may lead to poaching, open swards and weed proliferation, both this year and in the following season. It is therefore better to contain the effects of any very heavy grazing pressure to fields that will be reseeded.
- Topping or spraying can be used to control docks, thistles and other weeds.
- Organic farmers will need to be vigilant against persistent weeds like creeping thistle by regular topping to avoid the problem becoming worse in subsequent years.
- Where overgrazing has led to abundant weeds a full re-seed may need to be considered.
- Consideration should be given to undersowing to increase the competition against weeds.

## SECTION 4: NEW GRASSLAND OPTIONS

This section identifies opportunities during the recovery from Foot and Mouth to introduce new types of grassland or to renew existing grassland as part of a redevelopment of current livestock production systems or the adoption of new systems.

### 4.1 Reseeding

Reseeding grassland may be a crucial step for those wishing to embark on new systems of farming, including producers changing from intensive to extensive systems (or vice-versa) or those converting to organic practices. Others may aim to improve their current set up by introducing new leys into their grazing or silage systems.

Key Points for re-seeding:

- Soil pH and P & K should be suitable for intended crop
- Use of non-selective herbicide to control perennial weeds (especially docks, thistle, nettle) before ploughing
- Application of some water soluble  $P_2O_5$  at sowing
- Seedbed should be fine and firm
- If undersowing, preferably cut cover crops for arable silage
- Midsummer sowing avoided, since soil moisture will be limiting
- If sowing in late season, adherence to mid-August deadline to reduce winter kill of young plants.
- Controlling any problem weeds as soon as possible
- Grazing down to 3 to 6 cm at intervals during early establishment phase

### 4.2 Sward renovation

Renovation of pasture, using techniques such as shallow or partial cultivation, oversowing or slot seeding, can be used to improve and upgrade both grazing and conservation leys. Shallow cultivation (rotovator or spike- rotavator) following use of a non-selective herbicide is a good technique where there is a need to control perennial weeds, or where there is a very dense sward. This can be used strategically to repair damaged swards and to boost tiller numbers after long heavy silage crops. Grass-harrows can be used without introducing seed as a way of conditioning swards and encouraging tillering.

Key Points for renovation:

#### Sward preparation

- Achieving a short, open sward with plenty of bare ground visible, either by heavy grazing or cutting followed by (repeated) grass-harrowing
- Applying P and K if needed but **no** nitrogen.

#### Sowing

- Spreading seed, either by fertiliser spinner or seedbox mounted on harrows.
- Drilling seed with slot seeder.

- Low seed rates can be bulked up with sand/sawdust or P and K fertiliser. If sowing just clover, frequent stirring is required as it settles out quickly.
- Roll or use stock to tread in seed.

#### Grazing management

- Continue to graze until seedlings emerge.
- Remove stock – rest for 4-5 weeks.
- Rotationally graze. Graze down to 4cm, rest again.
- Heavy grazing should be avoided during first winter and following spring for best results.

#### Timing of operations

- Clover seed should be sown no later than mid-August, grass seed no later than mid September to reduce winter losses.
- Spring operations provide seedlings with a long growing season ahead but it can be difficult to stop grass smothering new seedlings through peak growth periods.
- After final silage cut, swards are open and require little work to create ideal conditions.

### **4.3 Changing systems**

There may be an opportunity to run a less intensive system i.e. reducing stocking rate using less soluble nitrogen and supplementary feed, and benefiting from an Agri-environment subsidy and or an added-value product. This could be achieved by adopting a clover-based system, converting to organic farming, extending grazing, growing alternative forages or a combination of these options. A degree of intensification may be the preferred option for some producers.

#### **4.3.1 Alternative forage crops**

Producers may be interested in switching from a grass silage based system to one including alternative crops such as maize. Alternative forage crops issues are dealt with in Section 7.

#### **4.3.2 Clover based systems**

There is a big difference between having *some* clover in the sward to boost production and provide a bit of nitrogen, and having a system that is *driven* by clover. To have an effective clover ley requires at least 30% of clover in the sward. This can be achieved through either a full reseed or renovation techniques. If contemplating putting in clover and managing leys specifically for that clover, here are some guidelines to consider.

Key Issues:

- Soil requirements: P and K indexes of 2 or more, pH above 6
- Matching clover type to the purpose of the ley
- Small leaved white clover: ideal for intensive sheep grazing
- Medium and large leaved white clover: more suited for mixed grazing, dairying and conservation
- Zero or reduced nitrogen applications (limit to 50kgN/ha in spring and autumn)

- Rotational grazing if possible
- Rest periods over winter
- Short silage shuts
- Use of silage inoculants
- Weed control methods
- Reducing the risk of bloat
- Persistence of red clover is severely restricted if faced with hard grazing and grazing through the winter

#### **4.3.3 Organic Conversion**

Before converting to organic production it is important to review the current whole farm system, gain an understanding of the principles of organic farming and identify any changes that would be required. Free advice outlining what is involved in organic conversion, including certification, production, marketing, and subsidies, is available through the OCIS helpline 01970 622100 (Wales) and 0117 922 7707 (England). Refer to Section 8 for specific information for organic farmers.

Grassland issues to consider are:

- White clover content of the swards
- Potential for crop rotation and the use of short or medium term grass - clover leys to build fertility, provide high yields and protein feed
- Current nitrogen fertiliser and feed level to support existing stocking rate
- Soil health and fertility
- Weed infestation and current reliance on herbicides
- The enterprise balance - sheep, beef, dairy, arable, horticulture and the role of grassland leys to meet the forage needs of the stock
- Proportion of grassland area suitable for hay or silage and the scope for running clean or safe grazing systems

#### **4.3.4 Extended grazing systems**

This year could provide a good opportunity for farmers considering adopting an extended grazing system to organise and install the fences, tracks and water facilities required.

#### **4.3.5 Agri-environment**

The option to develop farming systems in agri-environment schemes or following agri-environment principles are discussed in Section 9.

### **4.4 Alternative enterprises**

In addition to alternative enterprises discussed in Section 1:

- Agroforestry - Planting trees at wide spacings to allow pasture and timber production on the same piece of land. Establishing trees is opportune when there are no stock on the property. This is a long-term option and would require considerable research into management for quality timber and potential end markets. Further information is

available from Jim McAdam of the UK Agroforestry Forum on (02890 255275) or via the Internet at [www.sylvan.demon.co.uk/forum2.htm](http://www.sylvan.demon.co.uk/forum2.htm)

## SECTION 5: FORAGE CONSERVATION

On farms affected by foot and mouth disease restrictions in animal movements, machinery movements or both may result in grassland which is normally grazed being used for silage. Disease restrictions may affect the timing of fertilisers, manure or harvest. As the range of restrictions may vary from farm to farm or even regionally it is important that guidance is sought from MAFF prior to conducting any silage-making operation, including access to a silage clamp in accommodation previously occupied by FMD affected livestock. It should be noted that new Emergency Instruction states that licences are required on form A premises, and in Protected Zones where crops are to be moved to another part of premises. It is likely that silage-making processes during the period under restriction will differ with respect to manure management, fertiliser applications, stage of maturity of forage, availability of machinery or contractors and will all need to be considered before proceeding.

*MAFF advice include:*

- 1. Hay may be made on Form A premises at any time but must be clean and stored away from animals for at least 2 months before use and may not leave the premises until after Form A restrictions are lifted. There are also some limitations on moving fodder off Form D premises.*
- 2. It is beneficial to the destruction of FMD virus if silage pH falls below 5.*
- 3. Big bale silage made in 2000 will be licensed off premises if certain conditions are satisfied, the main condition being that the bales are unbroken.*

### 5.1 Methods of forage conservation

#### Silage

Silage will be the most practical method of forage conservation for most farmers and for some, silage production will be maximised due to the opportunity of increasing the number of cuts. If silage-making is delayed as a consequence of late application of manure/fertilisers or movement of stock, then this will result in reduced silage quality.

#### Clamp silage

Normal clamp management procedures should be maintained ensuring that high dry matter crops (25-40%DM) are short chopped (10 to 15 mm) and low dry matter crops (20-25%DM) are chopped (25-35mm). Consolidate the silage well remembering that the packing density from the wheels of a normal tractor will only reach 200 mm. Application of biological inoculants on high quality silage has been shown to give a £2 return for every £1 spent.

#### Big bale silage

Big bale silage is a flexible harvesting system. This system will enable small amounts of grass to be harvested at optimum quality. The bales can be stored *in situ* thus limiting on farm traffic. Normally when crops are harvested at >25% DM for big bale silage the costs are £4 /t DM higher than clamp silage for a three cut system. However, if second

and third harvests are light crops then the differential in costs diminishes. Harvested bales need to be film wrapped within 2-4 hours of baling and should be wrapped at point of storage to avoid any possible damage during transport. Biological inoculants applied to baled silage where the dry matter content is less than 35% have been shown to be cost effective in terms of improved silage quality.

### Field clamp silage

Field clamps must be situated at least 10 metres from any watercourses, ditches or land drains and sites must be agreed with the Environment Agency 14 days before the site is used. Field clamps need to be covered with polythene, however this may be a cheaper option than baled silage.

Where either bales or field clamps are used the site must be protected from wind, birds and rodents. Stacks should be checked regularly for any damage.

### Haylage

An alternative to making silage. This could then be used as a feed for sheep or horses. Good quality haylage should be made from good quality grass. After cutting grass should be wilted to a high dry matter (50 -60%) quickly.

Making high quality haylage is a difficult process and requires rapid removal of air and maintaining an air free environment for the whole storage period. Natural fermentation is slow. For example, in baled haylage 6 layers of film wrap (normally 23 turns of the wrapper for a 750mm width film) should be used and wrapped as quickly as possible within 2 hours of baling as this reduces the growth of yeasts and moulds.

### Hay

For some farmers it may be more practical to put some fields into hay production. This could either be kept as winter feed for own stock or sold for other livestock including horses.

Where farmers intend to make forage for equines the grass crop must be ragwort free.

## **5.2 Silage crop management**

### Cutting dates and silage quality

If silage-making is delayed then this will result in reduced silage quality. Digestibility of herbage between 10 May and 7 June declines by nearly 4 percentage units each week the harvest is delayed. Similar effects are found in delayed re-growth for second cut silage. The reduced digestibility of 4% will result in additional concentrates of 1.5 kg and 1.2 kg being fed to dairy cows or finishing beef cattle in order to sustain milk yield or carcass gain. If grass crops lodge before harvest then this can accelerate the rate of decline of digestibility up to 9% per week. High quality silage is required (D value 70+) for lactating dairy cows, young beef cattle and pregnant ewes. Suckler cows with calves, dry dairy cows and finishing cattle can be fed moderate quality silage (D value 65). Silage quality below D value 65 can be fed to in calf suckler cows.

### **5.3 Farm services**

Farmers are advised to consult the MAFF guidelines with regards to the following disinfecting procedures.

#### Contractors

The use of contractors on farms will largely be determined by individual restrictions. Disinfecting procedures should be in place and contractors aware of such procedures. Where normal arrangements have been disrupted consideration should be given to accessing local machinery rings or agreements with neighbouring farmers.

### **5.4 Other Options**

For farms that are at presently managing grassland under a stockless system, either due to depopulation or housing of stock, other options may be viable such as alternative forage crops. For further information see Section 1 on grassland management on a de-stocked farm, and Section 7 on alternative forage crops.

#### **Further information**

The document “Silage and Hay-making, and Grassland Management During Foot and Mouth Restrictions: Guidance to Farmers” is also on the MAFF website. It includes a link to a summary table of restrictions on making using silage/hay and manures, under Foot and Mouth Disease legislation.

## **SECTION 6: HOUSED LIVESTOCK**

Many farmers are housing their stock this summer because they are unable to turn stock out to grass or are concerned that grazing animals are more likely to be exposed to residual traces of foot-and-mouth.

### **6.1 Forage available**

If sufficient forage is available i.e. silage, hay or straw then this forage can be fed with a suitable supplement such as barley/wheat plus protein.

If stock cannot be sold then lower levels of compound may be fed but this will increase forage intake.

If forage is in short supply then silage can be eked out by feeding other products. Straw can be used to replace silage but a higher compound supplement will be required. Drying off dairy cows earlier may be an option on some farms to enable a transfer to feeding straw.

Sugar beet feed or brewers grains are high digestible fibre feeds that can be used with straw.

Citrus pulp, arable by-products, maize or barley distillers are other options to consider.

Dairy cows can continue on winter rations so long as forage remains available and then will require purchased forage or transferred to zero grazing.

*Further information available on SAC web-site ([www.sac.ac.uk](http://www.sac.ac.uk))*

### **6.2 No forage available**

Beef cattle can be finished on a cereal beef ration. An *ad libitum* ration based on barley/wheat plus protein and a small amount of straw or hay will be sufficient. This is a rapid finishing system with high growth rates (1.5 - 2.0 kg/day). It is particularly suited for finishing bulls or steers. It can be used for heifer finishing but they tend to finish at lower weights and can easily become overfat.

Where grass is available but cannot be grazed by livestock then zero-grazing may be an option.

### **6.3 Zero-grazing**

Zero-grazing is a method of cutting grass directly from the field and feeding it fresh to housed stock. The system is extremely efficient in grassland utilisation and prevents the wastage associated with any grazing system. An increase in stocking rate and a 20% improvement in liveweight gain may be possible when compared with traditional grazing systems. Daily harvesting is required so zero-grazing incurs high labour and machinery costs. Pressure is increased on the housing system and slurry capacity and disposal needs to be considered.

## Harvesting

Fresh grass needs to be fed daily and for high yielding dairy cows twice daily feeding may be required. Grass should be cut direct if possible and a double chop forager harvester is ideal for this purpose, rather than cutting with a mower and picking up separately with a forage harvester. If a mower is used then minimal chopping is required. Grass should not be damaged during harvesting and chop length should be long. Short chopped grass heats quickly and will reduce animal intake and performance. It is best to cut in the afternoon to take advantage of the higher sugar levels in the grass.

Soil contamination can be a problem and recently manured pastures, mole hills and poached or wet land should be avoided.

## Crop

The aim is to provide high quality herbage throughout the grazing period. For efficient use, grass should be cut when at the full leaf stage (12-15cm in height) down to 5-6cm for perennial ryegrass leys or 8cm for Hybrid/Italian leys. If swards become mature they can be left and made into clamp or big bale silage.

Cutting can be either in a block or around a field and the interval between cuts is usually 3-4 weeks.

Fertiliser should be applied after each cut.

## Carting

Machinery for zero-grazing does not need to be expensive. A double-chop forage harvester and a trailer are sufficient for most sheep and beef producers although bigger more elaborate machinery may be required for larger producers and the majority of dairy farms.

All machinery must be disinfected if harvested grass is transported by road. There are specific requirements for disinfection of machinery before and after transport on highway on form A and Protected Zone premises. This will increase time between loads. If possible, grass should be cut close to the housed stock and road journeys avoided.

If contractors are used then strict disinfecting procedures must be practised.

## Feeding

Feeding fresh grass daily through a feeder-wagon is the preferred method. Grass dry matter content can vary considerably from day to day (from under 10% to over 20%) so it is critical to maintain dry matter intake during periods of wet conditions. Fresh drinking water should be available at all times. Water troughs or bowls should be cleaned regularly.

## 6.4 Housing

Cattle housed during the summer do not pose any more health problems than cattle housed at other times of the year. Parasitic infections such as gastro-enteritis and lung-worm are not a problem with housed cattle.

### Environment

High summer temperatures can be a problem and adequate shade and ventilation should be provided. Roof insulation may be needed.

### Space requirements

Grass fed to housed cattle is generally low in dry matter and extra bedding and lower stocking rates are required. Floor space requirements are presented in the following table:

#### **Floor space requirement for cattle fed grass inside**

<b>Liveweight (kg)</b>	<b>m<sup>2</sup>/ animal</b>
100 – 200	3.0
200 – 300	3.5
300 – 400	4.0
400 – 500	4.5
500 – 600	5.0

### Health and Welfare

Respiratory disease is the biggest problem of housed cattle. Good ventilation, low stocking rates and avoiding mixing stock of different ages will help to prevent the risk. If respiratory problems occur then veterinary advice should be sought immediately.

Treatment for lice and ringworm is required. New Forest Eye can occasionally be found in housed stock but can easily be treated.

### Animal waste

Extra slurry/manure will be produced and will need to be stored or can be spread back on the land providing no restrictions are in place. Solid and semi-solid manure/slurry which cannot be disinfected on form A premises will instead be isolated under a restriction notice on the farm for at least 3 months even after all other restrictions are lifted.

## SECTION 7: ALTERNATIVE FORAGE CROPS

- These crops may be used to delay the harvesting period and/or provide alternative feeds where normal conservation is not possible.
- Some of these crops may not qualify for forage area calculations (check with the MAFF regional office regarding aid payments for these crops).
- Some of these crops will require specialist equipment for sowing and harvesting (check MAFF regarding possible restriction orders on movement of equipment).
- Legume crops are low in sugar content and may require a silage additive.

	Sowing window	Harvest window (forage)	Use *	Soil	Seed rate	Yield t dm/ha	General comments
<b>Legumes ( high protein forage )</b>							
Lucerne	April-Aug	4 cuts (every 6-7 weeks)	S ZG	Free draining pH above 6.2	20 –25 kg/ha	15 **	Sow 10mm deep into very fine seed bed. Nitrogen fixing crop – No N ferts required
Red Clover	April- Aug	3 cuts (every 6-7 weeks)	S; G late summer	Most soils pH above 5.8	15 kg/ha	12 **	Sow 10mm deep into very fine seed bed. Nitrogen fixing crop – No N ferts required
<b>Pulses ( high protein forage )</b>							
Peas	March-May	12 –14 weeks from sowing	S ZG G	Free draining pH above 6.0	150-200 kg/ha	7	Sow at 30-50mm depth. Nitrogen fixing crop – No N ferts required
Beans	Feb-April	12 –16 weeks from sowing	S ZG G	Prefers heavy, moisture retaining soils pH above 6	200-280 kg/ha	9	Sow at 30-50mm depth. Nitrogen fixing crop – No N ferts required
Lupins	March-May	12 –14 weeks from sowing	S ZG G	Free draining pH 5-7	90 – 180 kg/ha depending on species	8	Sow at 30-50mm depth. Nitrogen fixing crop – No N ferts required

<b>Spring Cereals (energy crops)</b>							
Maize***	April-May	Silage : Sept-Oct ZG late summer	S ZG G	Free draining pH above 6.0	100,000 – 120,000 seeds/ha	14	Careful selection of site required to ensure crop reaches suitable maturity
Barley	Feb-May	Whole crop silage :July– Sept	S ZG G	Free draining. pH above 6.2	180 – 200 kg/ha	11	Good cover crop for undersowing
Wheat	Feb-May	Whole crop silage :July–Sept	S ZG G	Free draining. pH above 6.0	200 – 200 kg/ha	12	High yield in fertile conditions
Oats	Feb-May	Whole crop silage :July–Sept	S ZG G	Free draining. pH above 5.5	180 – 200 kg/ha	10	Grows under wide range of soil conditions
Triticale	Feb-May	Whole crop silage :July– Sept	S ZG G	Free draining. pH above 5.8	180 – 200 kg/ha	10	
Rye	Aug-Sept	Late autumn & early spring	G ZG S	Free draining. pH above 5.5	170 kg/ha	3.5 by April	

<b>Brassica (energy crops)</b>							
Kale	Mar-June	Sept- Mar	G ZG S	Well drained pH 6.0 – 6.5	2.5 - 5.0	6.5	Sow into firm, fine seedbed at 10-20mm depth
Rape	Apr-Aug	3 months from sowing	G ZG	5.5 – 7.5	5 – 10	5.5	Sow into firm, fine seedbed at 10-20mm depth
Stubble Turnips	Apr- Aug	2-3months from sowing	G		5 – 8	3.8	Sow into firm, fine seedbed at 10-20mm depth

Swedes	April – June	Nov – March	G R	Well drained	66,000 – 133,000 seeds/ha	7.0	Sow into firm, fine seedbed at 10-20mm depth
Fodder Beet	April - mid May	October	R	Well drained 5.8	70,000 – 100,000 seeds/ha	12	Sow into firm, fine seedbed at 10-20mm depth

\* Use in order of suitability G – Grazing ZG – Zero grazing S - Silage R – lifted Root

\*\* Perennial legumes. Yield in establishment year approx. ½ that of harvest years

\*\*\* Maize for clamp silage only

### Cash Crops

- Cash crops, such as cereals, pulses and oilseeds, may offer an alternative option for some areas.
- Cash crops should only be considered after a business plan and cashflow projection have been completed i.e. plan ahead and identify markets; consider quotas and crops grown under contract.
- Most of these crops will require specialist advice and equipment for growing and harvesting - checks should be made with animal health regional offices regarding possible restriction orders on movement of equipment.
- Check with MAFF regional office regarding requirements to qualify for aid payments for cash crops.

## SECTION 8: ORGANIC FARMING

Many of the guidelines for grassland management contain technical detail of relevance to both conventional and organic farmers. Points of special interest to organic farmers are briefly outlined below.

Many are particularly applicable to the overstocked farm, where the use of inorganic fertiliser to produce extra grass growth under a conventional system would not be an option under organic farming.

Good manure management will be important for optimum return of nutrients, and storage may be a problem in restricted areas where application is not permitted. However this may offer an opportunity to compost effectively, before spreading, once restrictions are lifted. Refer to Section 10 for information on manure management.

- Where ungrazed pastures have to be topped, cut and mulch with care to avoid build up of decaying vegetation by using flail mowers or other means of spreading cut material. This should help to build fertility and organic matter particularly where manure application is restricted. Restrictions on manure applications may mean alternative crop nutrients are needed. Permitted products for organic farmers include:

Phosphate - ( $P_2O_5$ ) rock phosphate, e.g. Gafsa usually 30%  $P_2O_5$ , Highland slag

Potassium - (K) Highland potash (10%). Farmers dependent on manure for crop growth, may need to discuss available options with their certification body, including the use of restricted products to support grass growth.

- Where additional feed supplementation is needed, available organic supplementary feed should be fed to milking dairy cows and finishing stock as a priority over breeding and store stock, to ensure that products retain organic status. Consult the certification body if any additional organic or in conversion feeds cannot be sourced.
- Where F&M restrictions dictate, zero grazing may be permitted by the certification body if it is for a limited period and if the area was part of the grazing plan. Confirm with certification body. See Section 6 for details of zero grazing
- To provide additional grazing it may be possible for organic farmers to graze set aside area and retain the set aside payment (as a result of a derogation from EU). Confirm with MAFF/NAWAD.
- Crop rotations may be disrupted by enforced changes so alterations such as maximising set aside, increasing the 'exploitative' cropping (provided it remains in a balance with fertility building), or including a new cash or forage crop could be considered on suitable land.
- Clean or safe grazing systems may be disrupted, so flock and herd health plans should be adjusted for the change in circumstances and veterinary advice may be needed. Producers should contact their Certification Body where there is a need to change animal health plans or for derogation to use restricted products.

- Management of clover swards are key to organic farming systems. Refer to Section 4 on the management of clover based systems.
- Weed control by the use of rotation, topping and grazing management is important to prevent weed build up for successful subsequent cropping and grass clover leys. See guidelines on topping for weed control in Section 3.

## **SECTION 9: AGRI-ENVIRONMENT OPTIONS**

Agri-environment schemes are designed to improve the natural beauty and diversity of the countryside which include enhancing, restoring, recreating targeted landscapes, wildlife habitats and historical features and to improve opportunities for public access.

Farms participating in any grant supported Agri-environment scheme and are affected by Foot and Mouth should check with their Project Officer before undertaking any change in grassland use. The following information is provided as a general guide to areas of grassland management, which may impact on agri-environment agreements.

### **9.1 Entry to an Agri-environment scheme**

Farms not already in such a scheme may consider this option following Foot and Mouth. For information about the Countryside Stewardship Scheme in England contact MAFF Rural Development Service or, in Wales, contact Countryside Council for Wales for information about Tir Gofal.

### **9.2 Stockless or Understocked Farms**

Farms in agri-environment schemes e.g. CSS or Tir Gofal, which no longer have animals to graze pastures may need to consider other options with approval of the Project Officer:-

#### Lowland

- Topping grassland should only be considered if the crop is very light/thin and where there is a weed problem e.g. creeping thistle infestation.
- Topping should be done with flail mowers/machinery that chops the herbage into small fragments to minimise the risk of the cut herbage smothering the underlying vegetation.
- Cutting the grass for hay or silage, instead of grazing, could damage or destroy some wildlife interests. However cutting may be acceptable if it is done in a way that creates areas of short and areas of tall vegetation within the field during the summer. This could be achieved, for example, by cutting 1/3 in May, preferably in strips to create heterogeneity, 1/3 in July and the whole area in September.
- Grazing with horses may be acceptable in some agri-environment schemes, providing it meets conditions of intensity and duration.

#### Upland

- For heather moorland 1-2 years with no grazing should not damage biodiversity interests. However, mature heather should be swaled/burnt in order to maintain a range in structure and age categories on the moor.
- For other vegetation types e.g. Molinia grassland 1-2 years with no grazing should not damage bio-diversity interests.

## **SECTION 10: MANURE MANAGEMENT**

Follow good agricultural practice guidelines as specified in the Codes of Good Agricultural Practice (COGAP) for Soil, Air and Water that relate to the collection, storage, movement and spreading of dirty water, slurries and solid manures. Observe any additional restrictions that may apply e.g. in Nitrate Vulnerable Zones.

Farms affected by Foot and Mouth disease and classified form A or Protected Zones should consult with MAFF/NAWAD offices before proceeding with any slurry or manure applications. Those farms in Infected Areas need to observe guidance on the MAFF website or contact MAFF/NAWAD.

*MAFF advice includes:-*

*It must be noted that where slurry has been disinfected this will alter the pH value and may require neutralisation before application on to land. On these farms slurry or manure applications may have been delayed and this will have implications for silage and other crops*

*In general, slurry produced from 1 February 2000 would be “suspect” and should only be applied to land which will not be grazed by FMD-susceptible livestock (cattle, bison, buffalo, sheep, goats, llama, alpaca, vicunae, deer, swine ) during the ensuing 3 months and should not border a neighbours fields.*

### **10.1. Manure Storage**

Farms may need alternative stores for FYM. Field heaps should be sited according to the Water Code (further information from the Environment Agency), i.e. at least 10 m from any watercourse and 50m away from any borehole or well. Run-off of contaminated liquor can be reduced by storage under cover. Avoid stacking heaps on sloping land and avoid making wheelings that can channel liquor away from the heap.

Reduce the volume of clean water entering stores by ensuring that all roof gutters are working properly. Reduce the volume of wash water where possible without jeopardising hygiene and welfare considerations. Consider covering the store to prevent rainfall entry.

Ensure that drains and channels on hardstandings are kept free from blockage and that no effluent leaves the hardstanding directly to fields and ditches

### **10.2. Manure Treatment**

Turning solid manure heaps enhances microbial breakdown and raises temperature which will reduce weed seed viability. Aeration of slurry may reduce nutrient concentrations and allow higher application rates.

### **10.3. Manure Application**

The Water Code should be followed, i.e. maximum application rate of slurry of 50 m<sup>3</sup> /ha (4500 gallons per acre) at any one time and a maximum of 250 kg N/ha/annum applied

in the manure. If in a Nitrate Vulnerable Zone, additional restrictions apply, information is available from the MAFF Guidelines for Farmers in NVZs.

*MAFF advice include:-*

*Refer to the legal prescriptions upon the method of application found in the 1983 Foot and Mouth Order (as amended) "Disposal of manure, slurry and litter" at Article 10 and 22 and refer especially to the prohibitions concerning removal, and use of equipment producing a spray or jet.*

If straw is in short supply, or none is available, then other bedding material such as sawdust or waste paper should be considered. Amounts of waste produced by cattle are presented below:

#### **Production of waste**

<b>Liveweight (kg)</b>	<b>Waste* (litres/day)</b>
85 - 140	7
140 - 330	14
330 - 450	21
Over 450	32

\*Faeces plus urine

Nitrogen supply to the crop will be affected by the method of application, as nitrogen can be lost to the atmosphere as ammonia. Incorporating into soil reduces losses as do alternative application techniques such as shallow injection and band spreading. Slurry and dirty water should be spread by low trajectory techniques resulting in large droplet size where possible and spreading on windy days should be avoided

#### **10.4. Effect on Grassland Management**

Where applications have been made to grassland, graze should be avoided for at least 21 days. Silage should not be cut for a minimum of 6 weeks following manure or dirty water application as this may affect silage quality. More solid manures may require a longer period before safe ensilage.

Where early, high quality silage is required it will be better to delay manure applications until after the silage cut. Inorganic fertilisers can be used to make up the shortfall in nutrients that would have been supplied by manure.

Useful References:-

<http://maffweb/animalh/diseases/fmd/restrictions/manures.asp>  
<http://maffweb/animalh/diseases/fmd/restrictions/crops.asp>  
<http://maffweb/animalh/diseases/fmd/restrictions/scert3rv1.PDF>