

RESPONSIBLE USE OF MEDICINES IN AGRICULTURE ALLIANCE

ruma

GUIDELINES

Responsible use of antimicrobials in pig production

Produced by the Pig Working Group of the
RUMA Alliance

May 1999

Revised September 2005

CONTENTS

	Page no.
Foreword by RUMA Chairman, Peter Allen MBE	2
Facts about RUMA	3
Classification of animal medicines	4
Responsible use of medicines in pig production	5
RUMA guidelines	6
Practical strategies for reduce the need to use antimicrobials on pig farms	8
1. Introduction	8
2. Disease prevention	9
3. Routine health procedures	12
4. Vaccination programme	12
5. Internal and external parasite control	13
6. Lameness	14
7. Health management of newborn piglets	14
8. Enteritis and pneumonia	14
9. Monitoring	14
10. Environment	16
11. Cleaning and disinfection	18
12. Pest control	20
13. Preventing injuries	21
14. Disease treatment	21
15. Withdrawal periods	22
16. Planning and training	23
Summary	24
<u>Appendix A - Antimicrobials in Pig Production</u>	25
Treatment and prevention of disease	25
Antimicrobials as zootechnical additives	26
International perspective	27
<u>Appendix B – Pig Veterinary Society – Guidelines for the Use of Antimicrobials in Pig Medicine</u>	28
Responsibilities	28
Farm Guidelines	28
Integration with preventative medicine programme	28
Review	28
Practice Policy	29
Population Medicine	29
Fluoroquinolones	29
Veterinary Health Planner	29

Dr Tony Andrews
Acorn House
25 Mardley Hill
Welwyn
Hertfordshire
AL6 0TT

Tel/Fax: 01438 717 900
Email: info@ruma.org.uk

RUMA is made up of the following organisations:

Agricultural Industries Confederation (AIC)
Animal Health Distributors Association (AHDA)
British Poultry Council (BPC)
British Retail Consortium (BRC)
British Veterinary Association (BVA)
Linking Environment and Farming (LEAF)
Meat and Livestock Commission (MLC)
National Beef Association (NBA)
National Consumer Council (NCC)
National Farmers Union (NFU)
National Office of Animal Health (NOAH)
National Pig Association (NPA)
National Proficiency Test Council (NPTC)
National Sheep Association (NSA)
The Royal Association of British Dairy Farmers (RABDF)
Royal Pharmaceutical Society of Great Britain (RPSGB)
Royal Society for the Prevention of Cruelty to Animals (RSPCA)

September 2005

Dear Reader,

It is with much pride and pleasure that I, on behalf of RUMA (the Responsible Use of Medicines in Agriculture Alliance), would personally like to welcome you to this second edition of the Guidelines. We trust that you will find them of benefit in the continual quest to maintain animals in maximum fitness and health and thereby provide food of the highest standard for the consumer.

This document is the result of the labours of many people and shows the benefit of an organisation such as RUMA which can call upon the knowledge and expertise of a large number of individuals in the different organisations that make up the Alliance.

This Guideline is a working document and is updated periodically as new information becomes available. The aim of these extended guidelines is to provide practical advice to advisers, be they veterinary surgeons or others, farm managers and interested farmers and stockpeople. Inevitably such a Guideline is lengthy and for many working at farm level they may find the shortened version. This can be found on the RUMA Website www.ruma.org.uk

We are always interested in comments on how to best improve the Guidelines and any such suggestions will be welcome.

Peter Allen, MBE,
Chairman, RUMA

FACTS ABOUT RUMA (RESPONSIBLE USE OF MEDICINES IN AGRICULTURE ALLIANCE)

What is RUMA?

It was set up in November 1997 to promote the highest standards of food safety, animal health and animal welfare in the British livestock industry. It is a unique independent non-profit group involving organisations that represent all the stages of the food chain from stable to table (allowing accountability and transparency) and from table to stable (allowing traceability). The aims, work and benefits of RUMA are recognised by members of the Veterinary Medicines Directorate, Food Standards Agency and DEFRA.

What are the Aims of RUMA?

The main aims of RUMA are to:-

- a) Identify issues of scientific and public concern in the areas of Public Health, Animal Health, Animal Welfare and the Environment.
- b) Provide an informed consensus view on the identified issues which will be developed by discussion and consultation.
- c) Establish and communicate guidelines which describe "best practice" in the use of medicines.
- d) Advise industry in the implementation of "best practice", especially in the development of Codes of Practice and Assurance Schemes.
- e) Communicate and to consult:
 - i) To change the way medicines are used.
 - ii) To influence the regulation of livestock production and use of medicines.
 - iii) To change the way farming is perceived.
- f) Promote the appropriate use of authorised medicines for disease prevention and control.
- g) Liaise with National Authorities.
- h) Identify practical strategies to sustain responsible use of medicines.

How Does RUMA Achieve its Aims?

The most obvious way is the publication of the Guidelines for the responsible use of antimicrobials for all the major food producing species such as dairy and beef cattle, sheep, pigs, poultry and fish. These are all working documents and built up from the contributions from member organisations. They are always open to alterations in the light of new developments

RUMA is a policy making organisation rather than a political one. It aims to produce a co-ordinated and integrated approach to best practice. It has an established network with government departments and many non-governmental organisations. This allows a spread of information to be undertaken and responses to be obtained. There has also been considerable interest in Europe in RUMA's activities and discussions have taken place within the European Union and with other Member State's organisations.

Classification of Animal Medicines

These Guidelines were drawn up at a time when the Veterinary Medicines Regulations 2005 are in draft format. The distribution categories will be changing: it is understood they will be:-

POM-V (Veterinarian)

Medicines that may be prescribed by a registered veterinary surgeon following a diagnosis. The prescription may be dispensed by any registered veterinary surgeon or registered pharmacist.

To include: Current POM and some P products for food producing and pet animals together with current MFS products.

POM – VPS (Veterinarian, Pharmacist, SQP)

Medicines which can be prescribed and supplied by a Registered Qualified Person (RQP) i.e. a registered veterinary surgeon, a registered pharmacist or a registered suitably qualified person (SQP) or it may be supplied separately by a RQP in accordance with a written prescription from another RQP.

Prior diagnosis is not a pre-requisite for a prescription for this category but the prescribing RQP must be satisfied that the person administering the medicine has the competence to do so safely and that the use is necessary for the routine control or treatment of endemic disease.

The RQP should take into account available Flock/Herd Health Plans when prescribing.

To include: Some current P, current PML products and MFSX products for food producing animals.

NFA/VPS (Non Food Animal – Veterinarian, Pharmacist, SQP)

Medicines which can be supplied without a prescription by a Registered Qualified Person (RQP) i.e. a registered veterinary surgeon, a registered pharmacist or a suitably qualified person (SQP).

The RQP must check and be satisfied that the person administering the medicine has the competence to do so safely and that the use is necessary for the routine control or treatment of endemic disease.

Current PML and MFSX products for pet animals (including horses which have been declared as not intended for human consumption).

AVM-GSL (Authorised Veterinary Medicine – General Sales List)

Medicines which may be supplied by any retailer. These may be for non food producing animals or will be included in the exemption list for food producing animals currently being elaborated by the Commission.

All antimicrobial products will be classified POM-V

Responsible use of medicines in pig production

1. All medicines used in the EU have been registered for their current uses on the basis that they are effective and safe to both man and animals. They reduce the suffering and distress associated with disease and speed recovery. Antimicrobials are used to treat bacterial and other microbial diseases in animals. Antimicrobials are sometimes used to prevent predictable disease incidence or at the outbreak of a disease in a herd or group to prevent in-contact infection (e.g. colibacillosis during the post-weaning period in pigs).
2. Antibiotics, other than coccidiostats and histomonostats, may not be used as feed additives from 1 January 2006, (Regulation (EC) No 1831/2003). Until then three antimicrobials, avilamycin, flavophospholipol and salinomycin, which were not of value in the treatment or prevention of diseases were used as zootechnical feed additives in pigs to enhance performance (also called growth promoters or digestive enhancers). These were used at low levels to improve the growth rate and efficiency of feed conversion.
3. The pig industry recognises that human health must be the overriding consideration guiding antimicrobial use. The Responsible Use of Medicines in Agriculture Alliance (RUMA) is a coalition of organisations including agricultural, veterinary, pharmaceutical and retail interests. This guideline is one of a series of species-specific documents developed by RUMA. The main aims are to communicate practical strategies by which the need for use of antimicrobials might be reduced; and ultimately to enable a livestock producer to discontinue unnecessary antimicrobial use without adversely affecting either the welfare of his animals, or the viability of his business.
4. A Strategy for British Pig Health and Welfare was launched by the pig industry in December 2003. A Pig Health and Welfare Council, with representatives from across the industry, welfare organisations and government, has been formed to oversee the successful implementation of the strategy. It will seek to ensure that the pig industry and its stakeholders are kept fully informed about the progress in achieving the strategy's successful outcome and uptake. The strategy seeks to support producers in improving pig health and welfare on-farm. RUMA fully supports the initiative and seeks to promote the concept of responsible use of medicines within the strategy.
5. Without good health, an animal's potential cannot be fully expressed. Health is essential for efficient performance and disease control is a key element of any successful management programme. Treatment of disease is not as effective or as economical as prevention. Poor health status is a major cause of increased variation in all forms of pig performance, breeding, nursery and especially grower and finisher performance. Many outbreaks of disease in pig herds can be avoided by using management practices that minimise exposure to disease, reduce stress, and include good hygiene and vaccination programmes. Key management areas are highlighted in these guidelines.

RUMA Guidelines

The use of animal medicines carries with it responsibilities. Under UK legislation, all antimicrobials are authorised for specific species and uses. A product will not be authorised unless very stringent requirements are met. The use of therapeutic antimicrobials is under the direct responsibility of veterinary surgeons. Farmers, however, have a very considerable role to play in ensuring that the directions of the veterinary surgeon are properly carried out and also in developing and applying disease control measures which minimise the need for antimicrobial use.

All farmers have a responsibility for the health and welfare of the animals on their farm. There are occasions where this is a joint responsibility with their veterinary surgeons in the discharge of correct and appropriate antimicrobial treatment and care. Farmers and stockkeepers can play a major role in ensuring the responsible use of medicines on farms by following the guidelines published here. Similar guidelines form part of all farm assurance schemes.

- All pig farmers must be totally committed to producing safe food.
- Pig keepers have a duty and responsibility to safeguard the health and welfare of animals on their farm.
- An appropriate herd health plan that outlines routine preventative treatments (e.g. biosecurity, vaccination and worming programmes etc.) and disease control policy should be drawn up, observed and regularly reviewed in association with the attending veterinary surgeon.
- Therapeutic antimicrobial products should be seen as complementing good management, vaccination, biosecurity and farm hygiene.
- Treatment with a medicine that requires a veterinary prescription should only be initiated with formal veterinary approval. In-feed medication must be covered by a Medicated Feedingstuff (MFS) Prescription.
- Accurate information must be given to the attending veterinary surgeon to ensure that the correct diagnosis, medication and dosage can be calculated. Clear instructions regarding diagnosis, medication, dosage and administration must be made available in written form to all who are involved in the care of the animals concerned.
- The prescribing veterinary surgeon must be made aware of other medicines being administered to the animals concerned so that adverse reactions can be avoided.
- The full course of treatment at the correct dosage must always be administered in a careful manner. Make sure that only target animals receive the medication
- For in-feed or in-water medication ensure that the end of medication is accurately determined by cleaning the header tank or feed bin as appropriate.
- Make sure that the appropriate withdrawal period is complied with before the slaughter of treated animals. The withdrawal time required should be specified on the Medicated Feedingstuff Prescription in the case of in-feed antimicrobials; or on the label of the medicine; or may be set by the veterinary surgeon.
- An animal medicines record book, copies of relevant regulations and Codes of Practice must be kept safely on farm e.g. the Veterinary Medicines Directorate (VMD) Code of Practice on the Responsible Use of Animal Medicines on the Farm.
- Accurate information must be kept on the identity of the pigs being treated and the nature of the condition being treated. Records should also include the batch number,

amount and expiry date of the medicine used, plus treatment time and date information for each animal treated and the withdrawal period that must be observed. Medicine records required by legislation must be kept for at least five years (even if the pigs in question have been slaughtered).

- Appropriate information on all medicines used should be readily available to stockkeepers and kept on file – e.g. product data sheets, package inserts or safety data sheets.
- Follow the manufacturers' advice on the storage of medicines and the disposal of unused medicines (check the label or package insert). Safely dispose of unused or out-of-date medicines and containers and application equipment (including needles to a sharps container) when you finish the treatment for which they were intended. It may be possible to return unused medicines to the prescribing veterinary surgeon or supplier for disposal. Follow RPSGB guidelines on remixing or reworking of batches of medicated feed.
- Any suspected adverse reaction to a medicine in either the treated animals (including any unusual failure to respond to medication) or farm staff having contact with the medicine should be reported immediately to the Veterinary Medicines Directorate (VMD) and the supplier. The report to VMD can be done through the prescribing veterinary surgeon or the supplier. The adverse reaction can be reported direct to the VMD by the livestock keeper. Adverse reaction forms can be found on its website www.vmd.gov.uk. A record of the adverse reaction should also be kept on the farm: either a copy of the VMD adverse reaction form or a note in the medicines record book.
- Co-operate with and observe the rules of farm assurance schemes that monitor medication and withdrawal period compliance. However, stockkeepers should never feel constrained from safeguarding the health and welfare of the animals.
- Work with the farm veterinary surgeon in monitoring the effectiveness of antimicrobials used and regularly investigate the possibility of alternatives (particularly through changes to management techniques) to see if they can offer the same level of protection of health and welfare as the use of antimicrobials.
- Adequate training and good recording systems are essential to provide a framework for identifying disease problems and making the necessary changes to management practices. This can lead to a reduction in antimicrobial use. Staff working directly with animals should be trained to identify health problems early and in the use of veterinary medicines.

Practical strategies to reduce the need to use antimicrobials on pig farms

1 Introduction

- a. For a specific disease to occur, certain combinations of factors involving the pig, the environment, and the disease agent must be present. Proper manipulation of nutrition, husbandry practices, and the environment will help to prevent disease. There are at least two reasons to give pigs proper care. One is an ethical concern for the pig's well-being. Another is production efficiency. Management practices that incorporate good animal care are usually also the most effective from a production standpoint. When pigs receive good care, production costs per kg of pork produced are less than when pigs are not well cared for.
- b. If certain management practices conflict with the well-being of the animals, it will be to the producer's long-term advantage to adopt practices that put the animals' welfare ahead of short-term cost savings.
- c. The health of pigs and the incidence of disease is directly affected by other areas of management. A high level of nutrition promotes general animal health and prevents many health problems. Farmers should know about the stresses, diseases, parasites and other health related conditions that may be unique to their area and especially to their specific operations. Disease control measures related to genetics and environment management also deserve attention, especially when controlling health problems.
- d. Pig disease outbreaks are often related to a high concentration of pigs raised continuously in the same unit or on the same pasture. Overcrowding and continuous use can result in rapid build-up or accumulation of disease producing organisms in the environment. These organisms can infect and keep re-infecting the herd. In addition, the movement of pigs from farm to farm can introduce new infectious disease-producing agents into the herd.
- e. Veterinary surgeons ensure that animal diseases are properly diagnosed and help to design preventive programmes. Farmers should consult their veterinary surgeon when they require a diagnosis of disease in their animals or when they need to design or modify a preventive disease programme. Disease prevention resulting in increased levels of health and performance must be made a part of a total management programme.
- f. These guidelines are designed to help producers evaluate their husbandry procedures with respect to the well-being of their animals and to offer production practices that are both ethically acceptable and cost efficient.

Four golden rules to control disease

- a. Since 1999 Post-weaning Multisystemic Wasting Syndrome (PMWS) has affected a high proportion of commercial pig herds in Great Britain. The disease affects all of the main pig producing areas in the world. In the absence of a vaccine and specific treatments Dr Francois Madec and co-workers in France demonstrated the practical value of management practices in the control of losses and summarized their advice in a 20-point plan. The measures primarily involved herd management (e.g. small groups of pigs at weaning, reduced mixing and batch farrowing to facilitate all-in all-out production), high levels of hygiene, cleaning and disinfection, close control of the environment and controls on the flow of staff, animals and air.

- b. The principles on which the controls for PMWS were based can be applied in large part to most pig diseases and also to the control and elimination of organisms like *Salmonella* spp which are food safety hazards. Mike Muirhead and thePigSite (www.thepigsite.com) summarised the key points on disease control into 4 golden rules. Keeping these 4 rules in mind and making efforts to follow their intent, will ensure you'll be on the right track.

Disease Control: Four Golden rules		
Rule 1	Limit pig-to-pig contact.	Disease spreads around a farm by pig-to-pig contact. Limit pig-to-pig contact and you will help to limit the prevalence of disease. REMEMBER pig-to-pig contact can also be INDIRECT by a needle, surgical instrument, manure or people. Spread can often be to many pigs in a pen or in large common groups etc.
Rule 2	"Stress" is a killer.	Stressed animals are far more likely to become diseased. This includes not only obvious physical stress factors e.g. overcrowding, chilling; but also exposure to micro-organisms which cause major stress to the immune system. THINK - If a procedure causes the pigs to become stressed, ask "can this be done in a less stressful manner?"
Rule 3	Good Hygiene	There is no substitute for good hygiene and biosecurity measures. Cleaning and disinfect buildings and instruments coupled with good hygiene will all make a difference. Don't spread disease by needle or other instruments.
Rule 4	Good Nutrition	Good intakes of colostrum provide essential antibodies to protect piglets as their immune system is developing. Balanced diets with adequate levels of trace elements, minerals, vitamins and anti-oxidants are essential if the immune system of pigs is to work properly in tackling diseases.

2 Disease prevention

The best way to prevent disease is to prevent it from entering the farm. It is important as part of a herd health plan to develop a preventive medicine programme and consulting with those who have additional expertise and experience in the use of medicines to prevent disease may assist this.

Biosecurity – Keep disease out

- a. Biosecurity is a herd management strategy designed to minimise the potential for introducing disease-causing organisms into the farm or its animals. People, pigs, pets or wildlife may transport diseases from outside the herd. Mechanical transmission of infection from faeces (main source), urine, saliva, nasal secretions, blood, milk or semen may occur where pigs directly or indirectly come in contact with contaminated clothing, boots, vehicles, equipment, bedding, feed or other materials. Air-borne transmission from other units or slurry spreading is also a factor to consider.
- b. From a health standpoint, the herd should be located at least two miles from other pigs. If this is not possible, attention should be given to the location of the nearest pig herds, prevailing winds and the likelihood of accidental exposure to other pigs, wildlife or domestic pets. A perimeter fence will discourage people and stray animals from entering the grounds. Bird screens on all building ventilation inlets and outlets reduce the potential for disease transmission by birds.

- c. Feed delivery, carcass collection and animal loading should take place in separate areas at the perimeter so that the people involved do not enter the unit. Feed bins should be located adjacent to perimeter fencing and the farm should provide its own blower pipes, if possible. A loading ramp should be available from the last finishing building near the perimeter fence, or pigs should be transported to the road using farm equipment, so that livestock lorries do not enter the unit. Clean and disinfect carcass collection and animal loading areas immediately after use. Vehicles, particularly carcass collection lorries, which have visited other units may also carry disease organisms. Vehicles from outside the premises must be cleaned and disinfected before entry to the unit. All equipment and tools should be cleaned thoroughly after each use. Ensure washings do not get carried on to or contaminate the unit.
- d. The risk of disease introduction through feed and bedding should be reviewed. Check that feed suppliers follow the independently audited Agricultural Industries Confederation (AIC) Code of Practice for the Manufacture of Safe Compound Animal Feedstuffs (UFAS). Try to ensure that feed and bedding material, e.g. straw, shavings, does not come from sources where it might have been exposed to livestock or their excrement.
- e. Although the risk of direct transmission of disease by people from nose, mouth or throat is minimal strict visitor policies should be enforced. People should only be allowed access to pig areas if it is absolutely necessary. Provided there has been a complete change of clothing and showering since visitors have been on other pig farms, a 12-hour overnight pig-free break should be adequate for most units. Visitors who must enter the herd should ideally be provided with rubber boots and protective outer clothing. As a minimum their footwear should be cleaned and disinfected. Foot-baths with disinfectant should be strategically placed and well-maintained. On high security sites downtime requirements may be specified and visitors required to shower and to change into clothes provided by the pig unit. Visitors should sign a book confirming that they comply with the unit's requirements.
- f. Pigs should be moved in each stage of production in a manner consistent with all-in all-out principles of production. Avoid mixing pigs. Change the system to avoid/reduce mixing. Don't put poor pigs back with younger ones. Adopt a "Slow track" system for casualties.
- g. When a group is moved from any stage, that area should be cleaned thoroughly by power washing, then disinfected. When multi-aged pigs are at one site always work from youngest to oldest pigs. Never go back without clean boots, overalls, and washing of hands. Workers should start the day with clean boots and overalls. Workers exposed to older pigs (adults or finishers) should ideally shower before entering the nursery or farrowing accommodation.
- h. Pigs that leave the farm for any reason - test station, sale, and shows - should not return to the farm. The risk of introducing disease organisms to the herd is too great to compromise this principle.

Adding new stock to the herd

- i. Introducing pigs from other sources is one of the main risks for acquiring new infections. Purchase healthy stock from reputable sources. The best way to prevent having to deal with a specific disease is to never introduce it into the herd. Incoming stock should not have diseases new to the herd. A declaration of the health status of the supply herd should be obtained from the breeding

company concerned. A vet-to-vet conference may be useful. Ideally incoming stock should be of similar health status to those already on the unit. If possible take animals from a single source and avoid mixing animals from multiple sources. Make sure the pigs are properly identified and delivered in a clean disinfected truck. Confirm that there have been no recent disease outbreaks on the farm of origin at the time of delivery.

- j. Never bring newly purchased sows or boars into a farrowing house or expose piglets to new animals. All incoming breeding stock should be quarantined in isolation for 30 to 60 days, ideally a minimum of 200 metres from the primary herd. Thirty days is the minimum period for adequate isolation and observation of new breeding stock. Longer periods - 40 to 60 days - offer even more security. Isolation allows pigs to recover from the stress of transport and to adapt to a new environment.
- k. The initial 30-day time period should be used to observe the stock for any signs of illness. During this period, employees who will not return to the main breeding herd should feed and look after the animals. Clinical signs of illness may disqualify the stock from addition to the main herd. A reputable breeding company would be expected to notify the owners of the receiving herd if a disease break should occur in the source herd during the 30 to 60-day quarantine period.
- l. During quarantine, the animals can be re-tested for any diseases that may be of concern depending on the source of the breeding stock. The new animals should be vaccinated for parvovirus and for erysipelas. Vaccination for other diseases is based on their prevalence in the area and the herd health policy. If incoming animals are from sites free of diseases commonly present on the unit they are likely to need protection by vaccination or gradual natural exposure and acclimatisation before joining the main herd. New breeding animals should also be treated for internal and external parasites.

Table 1. Procedures to perform on incoming stock during the quarantine period.

Procedure	When to perform
Observe for illness	Entire quarantine period
Serological tests? E.g. PRRS, Salmonella	21 days after arrival
Vaccinate for parvovirus and erysipelas	On arrival and two weeks later
De-worm and treat for lice and mange	On arrival
Expose to cull breeding animals and manure from herd	Last two weeks of quarantine

- m. A second 30-day period can be used as an acclimatisation period for new breeding stock. Incoming stock should be vaccinated for, or exposed to, diseases of the recipient herd. If appropriate, they could be housed in fence-line contact with cull breeding animals or exposed to manure from the herd to develop a level of immunity to pathogens that may be endemic in the receiving herd. The second 30-day period may also be a good time to test breed new boars to some finishing gilts, and to observe for libido and for any physical defects that may be present and were not noticed earlier.

- n. Other methods for introducing new genetic material into a pig herd include the use of artificial insemination (AI). AI has been used in the past to bring semen into nucleus herds, and is becoming increasingly popular in commercial breeding units. If used properly, artificial insemination can be useful for introducing new genes while minimising disease transmission risks. However, some diseases can be transmitted in semen.
- o. AI stud boars should be screened regularly for important infectious diseases for which a reliable diagnostic test exists, such as Brucellosis, PRRS, Aujeszky's Disease and Classical Swine Fever. Collection and handling of semen should include strict sanitation and hygiene practices as a matter of routine. Antimicrobials may be added to the semen as an additional precaution against the spread of infectious disease.
- p. Embryo transfer as a method of introduction of new genes is rarely used, but may become more common in selected cases. The general disease control principles for AI are also appropriate for embryo transfer.

3 Routine health procedures

Stringent prevention programmes involving biosecurity practices and the routine isolation and quarantine of new animals, combined with routine surveillance and action when necessary, are recommended health procedures. Because of the prevalence and impact of specific diseases, a vaccination programme is usually practised.

4 Vaccination programme

- a. Vaccinations are available for a number of diseases that affect pigs. In many cases, vaccination constitutes the major part of the control of the disease. In others it is only a small part of the control programme. Vaccination programmes need to be tailored to each farm and should be developed in consultation with a veterinary surgeon. Remember that vaccination only raises a pig's level of resistance. If other important management procedures are neglected, even this raised level of resistance may be inadequate to prevent disease.
- b. Vaccination is a powerful tool for controlling disease on pig farms. The use of vaccine has the ability to reduce the production losses associated with many diseases. Vaccines have two major effects. The primary benefit is to the animals that are vaccinated, as they are less likely to become diseased. These animals can therefore withstand disease challenges and perform better. Vaccines are usually very specific and careful assessment may be required on the farm before their use. Appropriate vaccines for your farm should be used on the advice of your veterinary surgeon.
- c. The secondary effect of vaccination is on the herd. As the immunity of the individuals rises, fewer infectious organisms are shed. This further reduces the presence of disease on a farm, effectively raising the health of the total farm population. This technique has been used to reduce disease to minimal levels.
- d. Vaccines must be stored and administered according to label directions if they are to be effective. In most cases vaccines will need to be stored in a refrigerator. Refrigerator temperatures should be monitored. Withdrawal time to slaughter must be observed at all times to avoid residues. A common time for administering many vaccines is before breeding and before farrowing. This protects the sow and passes antibodies to the piglets for their protection.

Alternatively vaccines may be administered to the young growing animal to give protection throughout the production period.

- e. For many bacteria and viruses there are no vaccines available and each farm will have a unique mix of these organisms many of which cause little overt disease. However replacement stock will react to any new challenges often at a time when they are destined for breeding. Discuss with your vet whether in view of the disease profile on your farm it would be sensible to pre-expose new gilts and boars to this challenge before breeding and pregnancy. One way of doing this is through fence-line contact of newly purchased boars and gilts, whilst in isolation, with other animals from the farm. Another method is to switch pens several times so breeding animals (females and boars) are exposed to each other's manure. Exposure could also be through transfer of manure from one pen to another. Breeding animals should be exposed to the infectious agents well before breeding commences and some may well take 60 days or more to become fully acclimatised.
- f. A vaccination programme should be drawn up and practised for each breeding herd. All gilts, sows and boars should be included. Vaccination for parvovirus and erysipelas is recommended because of the prevalence of the organisms, the relatively inexpensive cost of the vaccines, and the relative effectiveness of the vaccines.
- g. Other vaccines must be evaluated on the criteria of risk of disease, cost and effectiveness. In all cases, the vaccine programme for an individual herd should be designed with the input of the herd's veterinary surgeon. The basic programme may need to be modified for an individual herd's situation, and timing may be changed to fit exposure and other challenges unique to a herd.

5 Internal and external parasite control

- a. Parasitic infections stress animals, affect growth performance and reduce resistance to other diseases. Successful parasite control and prevention programmes require planning. Controlling internal and external parasites promotes animal health. Treatment with antiparasitic medicines will usually stop cases of acute parasitism. However, unless this is part of a strategic programme, animals are often reinfected almost immediately and their parasite burdens may return to near pretreatment levels. Control programmes should have as a goal the elimination of chronic subclinical parasitism and environmental contamination.
- b. Attention must be given to good management as well as treatment with antiparasitic medicines for any programme to be successful. The specific products used and the timing of their administration should be planned carefully. Read and follow label directions on medicines to ensure effective control. Withdrawal times to slaughter must be strictly observed to avoid residues.
- c. All incoming breeding stock should receive two treatments, two weeks apart, with external and internal parasiticides. Faecal samples monitored quarterly from each production area to determine the presence of internal parasites allow further refinement of the de-worming programme.
- d. Animals in all phases of production should be observed routinely for signs of external parasites. Skin scrapings should be conducted, on a number of breeding animals appropriate for the size of the herd, every six months to check for external parasites. An external parasite control programme can be designed based on the results of the monitoring.

6. Lameness

Every effort should be made to control lameness as it can be a serious welfare problem. If the cause of lameness is not clear, normal treatments are not working or the animal is severely lame veterinary help should be sought on welfare grounds.

7. Health management of newborn piglets

- a. It is important that newborn piglets receive colostrum -- the sooner the better! The first hour after birth is optimum but they should all receive colostrum within six hours of birth. Newborn animals that receive adequate amounts of colostrum are far less susceptible to scours and other diseases.
- b. Accurate diagnosis of conditions in piglets is important for determining prevention and treatment procedures. Scour problems are an ever-existing threat to piglets. A good programme of adequate nutrition, management, cleaning and disinfection and a good herd health programme are necessary to minimise the incidence and losses. Early diagnosis and treatment will reduce the threat of an outbreak. The correct diagnosis is also very important when considering vaccinations and other control procedures for the herd.
- c. Treatment for scours is very similar regardless of the cause. It should be directed toward correcting the dehydration, acidosis, and electrolyte loss. Antimicrobial treatment can be given simultaneously with the treatment for dehydration but is not always necessary. Dehydration can be overcome with simple fluids given by mouth early in the course of the disease.
- d. Keep daily records on the treatment administered and a record of the piglets treated. This aids in evaluating the treatment and using follow-up treatments as necessary. If an outbreak of scours occurs, persistent treatment and records are essential for doing a good job.
- e. Consider identification of piglets especially potential breeding replacements.

8. Enteritis and pneumonia

- a. Management practices are important in the prevention and control of enteritis and pneumonia, especially in terms of vaccination and housing, including appropriate disinfection routines and adequate ventilation.
- b. In the treatment of scours good management and the use of electrolyte solutions often removes the need for antimicrobial usage.
- c. Good management and the use of appropriate vaccines often remove or significantly reduce the need for antimicrobial usage in the treatment of pneumonia. Early diagnosis of pneumonia and effective treatment helps to limit the spread of pneumonia within groups and should also reduce the effects of pneumonia in individual animals.
- d. Particular attention should be given to options for improving ventilation and minimizing draughts when pneumonia occurs. It is important to routinely check that fans and ventilation systems are operating effectively.
- e. It is important to accurately diagnose the cause of the disease so that in consultation with the farm veterinary surgeon measures for treatment and prevention can be tailored to the agent responsible.

9. Monitoring

Animals should be observed regularly for any sign of illness, injury, or unusual behaviour.

- a. Serological tests should be done for diseases common in the area where the herd is located. Other diseases that can be monitored routinely include serology for PRRS, *Actinobacillus pleuropneumoniae*, and *Mycoplasma hyopneumoniae*. Nasal turbinate swabs can be taken and cultures done for the presence of *Pasteurella multocida* and *Bordetella bronchiseptica*.
- b. Positive culture results must be correlated with clinical signs and slaughter lesions before specific recommendations can be made concerning the significance of the culture findings. Carcasses can be checked for lesions at slaughter. Lesions observed at slaughter indicate that the organisms which cause particular lesions may be present in the herd but do not confirm their presence. Different organisms may cause the same type of lesion in many cases.
- c. Producers and veterinary surgeons should understand the inherent limitations of serological testing. Most serological tests do not have a level of titre response that is "black or white". Results of most serological tests require some interpretative skills, including an awareness of the clinical signs present in the herd. In many cases it is a difficult matter to differentiate vaccine titres from titres to the "field" organism.

Table 2. Routine health procedures for breeding stock herds.

Procedure	When to perform
Vaccination for parvovirus and erysipelas	All gilts, sows and boars, according to product protocols
Vaccination for erysipelas	Pigs at weaning, repeat at eight weeks of age and every 60 days if necessary
Monitor faecal samples	Quarterly
Make skin scrapings and observe for clinical signs of mange	Every six months
Make slaughter checks	Quarterly if possible
Serological monitoring	Quarterly or as needed
Feed sampling for particle size and nutrients	Every six months
Feed sampling for mycotoxins	Save sample from each load
Make nasal swabs	As needed or as determined by farm veterinary surgeon

- d. Feed samples should be checked at least every six months for proper mixing, particle size and the presence of the major nutrients in the amounts calculated in the ration formulations. Samples should be held back and saved from each major load of grain/feed for mycotoxin testing if clinical signs indicate the need. However, because mycotoxins occur predominantly in "hot spots", routine testing for their presence probably is not necessary unless a problem is suspected.
- e. Records of vaccinations and parasite treatments should be available to help detect health problems. These records do not need to be elaborate, yet are a valuable management tool. The more detail provided, the more likely those problems will be detected early.

Slaughter checks

- f. Quarterly slaughter checks for the presence of gross lesions of ascarid migrations in the liver, pneumonia in the lungs, and atrophic rhinitis in the nasal turbinates are recommended. The skin and joints and intestinal and reproductive systems can also be observed during slaughter checks. Findings can be used to estimate the presence of disease in the herd and to refine health management procedures.
- g. The number of animals needed to be able to state disease levels with confidence has been established with epidemiological and statistical methods. Unfortunately, it is very difficult to proclaim a herd as "free" of most diseases.
- h. However, statisticians have determined the number of pigs needed for a check from a herd to provide a 95 percent degree of certainty of discovering a disease if it is present. The pertinent numbers needed for most producers are 11 and 29. In any population of more than 140 animals - for example a 300 pig finishing unit - an 11-head slaughter check would give 95 percent confidence that you would find a disease if it were present in 25 percent of the population. A 29-head slaughter check would give 95 percent confidence from any population of 1,000 or more if 10 percent of the population were infected.

10. Environment

- a. Environmental considerations in pig production operations must include the environmental welfare of the pigs as well as the farm design to protect air and water quality. Consideration must also be given to the work environment for the owner, manager, and/or employees. Proper design and management of farms should provide the proper environment for raising pigs and also protect the natural environment.
- b. Insulation and proper ventilation of buildings will help prevent disease. Wallows, shallow ponds, slow moving streams, and other wet places breed disease. Drain or keep pigs away from such areas. The development of unplanned wallows can be avoided by frequently moving the troughs and waterers, and by providing temporary shade.

Air Quality

- c. Air quality is important to the health and well-being of pigs and those humans who manage and tend the pigs. The measure of air quality relates to the content of certain gases, particulate matter (is this dust?), and airborne microbes in the air around or in pig facilities.
- d. Good ventilation and proper waste management will ensure acceptable air quality. Although a number of gases may be present in pig housing, the most important in terms of air quality are ammonia, hydrogen sulphide, carbon monoxide, and methane. Ammonia concentration in buildings should be less than 10 ppm and should not exceed 25 ppm for prolonged periods in tightly closed buildings.
- e. Hydrogen sulphide levels in concentrations of less than 10 ppm are recommended. If manure is stored in pits in buildings, care must be taken during the times when the waste is agitated. The concentration of hydrogen sulphide above the floor can rise dramatically and must be expelled.
- f. Carbon monoxide can be lethal to humans as well as to pigs. When gas heaters are used in buildings, the concentration of carbon monoxide in the building is a concern. Gas heaters must be vented or fresh air circulation provided. Concentrations of carbon monoxide should not exceed 150 ppm.

- g. Methane is a product of anaerobic digestion of pig waste. If manure is stored in pits in buildings, methane concentration in the building is a concern. Although methane is not toxic, it can be explosive.
- h. Ventilation rates in buildings should be increased when under-floor manure pits are being agitated or emptied. Evacuating the gases being released from the pits is important for the pigs' well being as well as for the health of the workers in the area.
- i. Airborne dust in pig buildings is usually the result of movement of feed, or the use of bedding materials. Increased animal activity and excessively high ventilation or air movement rates can cause dust particles to become airborne for extended periods of time.

All in/all out

- j. The key features required in All-In All-Out (AIAO) production are:
 - 1. Have a separate room and air flow for each group of pigs.
 - 2. Keep pigs of the same age and source together.
 - 3. Wash rooms down between each batch of pigs.
- k. The above principles are not always easy and practical to implement but these AIAO principles can lead to significant improvements in productivity. The throughput of animals may be reduced as the rooms, pens, and buildings may not be kept full using AIAO. Since throughput (pigs sold per unit of floor space) is a key feature of profitability, this is a disadvantage, in comparison with continuous flow buildings where floor space can be maximised.
- l. In some units, where pigs are sold in a very narrow weight range, the emptying of a room or pen can take more than a month if growth is uneven. During this time, pens will not be optimally stocked. Innovative sorting of the animals may help utilise floor space better. Overall the throughput will increase when AIAO is adopted. This occurs because significant improvements in performance are achieved as a result of the reduced disease challenge.
- m. In general, the benefits of changing from continuous flow production to all in/all out production are:
 - 7 to 10 percent improvement in average daily gain and feed efficiency.
 - 14 to 28 day improvement in days to market.
 - 1 to 4 percent improvement in mortality during the grower to finish phase.
 - Fewer "tail-ender" pigs.
- n. The main challenge is to have pigs in large enough groups from a single source. Dutch research indicates a group size of 200 is optimal, but only large farms can generate these large groups. One approach has been to encourage batch farrowing and to use subsequent pig flow to generate bigger groups. Farrowing every 3-5 weeks rather than weekly has advantages for farm labour as well as for pig flow.
- o. Newborn pigs, weaners, feeders and breeding animals should be kept separate. Some diseases that may cause few or no clinical signs in one group may be highly pathogenic to another group.
- p. Pigs should be moved as a group during each stage of production in an all-in/all-out manner. Avoid mixing pigs. Change the system to avoid/reduce mixing. Don't put poor pigs back with younger ones. Adopt a "Slow track" system for casualties.

- q. When a group is moved from any production facility, that area should be cleaned thoroughly by power washing and then disinfected. Disinfection should be attempted only after thorough cleaning.
- r. Cross fostering may enhance sow to pig transfer of pathogens. Avoid where possible cross-fostering after pigs are 24 hours old. Cross fostering age may vary from herd to herd.
- s. A number of disease elimination strategies based on the strategic use of partial depopulation, vaccines and antimicrobials can be of value but they should always be used following consultation with a veterinary surgeon as otherwise the expense could be wasted. In some situations it may be appropriate to depopulate the site and restock with pigs that have a higher health status.

Slurry disposal and waste management

- t. Slurry pits should be large enough to hold 4 to 6 months production to reduce the need for frequent emptying. Ideally the pit should be outside the unit with channels running from different buildings. Storing slurry for as long as possible (at least four weeks) will kill most salmonellas and other organisms. Aerosol spread is a risk when spraying slurry on to land and injection is recommended instead of surface spreading. Use farm owned or dedicated vehicles for removal to reduce risks. Use fenced pads for solid manure and stack and compost before spreading on arable land. If spread on pasture keep pigs off for at least three weeks.

11. Cleaning and disinfection

Cleaning and disinfection is the most basic and most important of all the disease control measures. Prompt and proper removal of wastes, and cleaning and disinfection of both equipment and the environment is central to disease control. Normally, the cleaner the environment, the healthier the pigs will be.

- a. Cleaning and disinfection procedures should include:
 - Removal of bedding, manure and feed.
 - Soaking the building for at least 2 hours before cleaning.
 - Cleaning thoroughly removing all dirt – “white glove” clean – i.e. surfaces should be clean when rubbed with a white cotton glove.
 - Using the right concentration of disinfectant on dry surfaces
 - Rinsing with clear water to remove all residues.
 - Allowing time to dry out before restocking
- b. Effective disinfection requires cleanliness first because disinfectants have little or no action on dirty surfaces. The organic material in manure and dirt inactivates the chemical disinfectant. Also, dirt and manure provide protection for disease organisms and the chemical solution is unable to penetrate and reach them. Cold temperatures reduce the effectiveness of most disinfectants. The chemical agents commonly used require several minutes in contact with disease-producing agents to be effective.
- c. Cleaning can be done with a shovel and a brush or speeded up by use of high pressure washers and detergents. Pre-soaking for at least two hours before cleaning will help make the job easier. When there is a lot of manure or dirt present, use a detergent. The detergent hastens the job of removing the dirt by increasing the wetting speed. Don't forget to clean walls above pig level and

ceilings or roofs. Aim for surfaces that are “white-glove” clean before applying disinfectant.

- d. If possible allow surfaces to dry before using disinfectants. It is important to make up the disinfectant at the correct concentration – read the label. Add a measured amount of disinfectant to a known volume of water e.g. If the correct concentration of a disinfectant is 4% add 4 litres of disinfectant to 100 litres of water. It may help to have a barrel of known volume and a specific measuring container for the disinfectant.
- e. Avoid using a pressure washer to apply disinfectant if possible. Many disinfectants are corrosive and will damage a pressure washer. Try to apply disinfectant with a low pressure sprayer as this gives droplets that are more likely to cling to surfaces and have time to be effective.
- f. Disinfectants need time to kill micro-organisms. Follow the manufacturer’s instructions and rinse to remove residues if required. Allow sufficient time for the building to dry out completely before re-stocking. Many micro-organisms are killed by drying.
- g. Some detergents and disinfectants can be combined for easier one-step cleaning and disinfection. Steam is also an effective method of cleaning and reducing infection but the cleaner nozzle would need to be held not more than 6 to 8 inches from the surface to have much effect in killing organisms.
- h. Disinfectant foot-baths should be strategically placed and well-maintained. Maintenance is important as otherwise foot-baths may become a source of contamination rather than preventing transmission. Dilution by rainwater, wrong concentration and infrequent replenishing reduce the effectiveness of foot-baths. Disinfectants will be inactivated by the accumulation of faecal matter in foot-baths. Soiled boots should be cleaned thoroughly and all gross faecal material removed before using foot-baths. Disinfectants will not kill infective organisms that are protected within faecal matter.

Table 3. Common disinfectants, their characteristics and uses.

Active compound	Uses	Range of effectiveness	Disadvantages
Chlorhexidine	Equipment, premises, foot baths	Some bacteria and viruses, ineffective against parvovirus, Pseudomonas	Reduced activity against certain organisms
Cresols, Phenols	Equipment, premises, foot baths	Variety of bacteria, limited effect on fungi and viruses, poor against bacterial spores	Strong odour with coal or wood tar distillates
Formaldehyde, other Aldehydes	Equipment, premises, foot baths	Variety of bacteria, bacterial spores, fungi and viruses	Irritating fumes
Iodophors	Cleaned equipment	Bacteria and fungi, limited effect on bacterial spores and viruses	Inactivated by organic material
Inorganic Peroxygen Compounds	Cleaned equipment & buildings	Many bacteria, viruses, fungi and spores	Inactivated by organic material
Quaternary Ammonium Compounds	Cleaned equipment	Variety of bacteria, limited effect on bacterial spores, fungi and viruses	Inactivated by organic material, neutralised by soaps
Chlorine, Hypochlorites, Chloramines	Cleaned equipment	Bacteria and fungi, limited effect on bacterial spores and viruses	Inactivated by organic material, may be irritating

- i. Cleaning and disinfection at farrowing time is extremely important. Farrowing pens should be cleaned and disinfected between every batch. Before the sow is placed in the farrowing pen, she may also be washed with detergent and water. Particular attention should be paid to the udder, but no part of her should be overlooked. The dirt on the sow's body, udder, and feet is likely to contain numerous worm eggs and disease germs, and the newborn pigs would be likely to swallow infective material with the first milk. Visitors should not be encouraged in the farrowing area.
- j. Discharges from sick animals that accumulate on bedding and floors are a potential source of infection. To reduce the disease burden, all bedding, manure, and other waste materials should be removed regularly from the buildings. On outdoor sites material from farrowing arcs is often burnt. Buildings should be thoroughly cleaned and disinfected.
- k. Many of the disease-causing organisms found in a farrowing house or finishing floor cannot live very long outside the body of the pig. By removing the animal, these organisms will be without their source of survival and will rapidly decrease in number. Vacating buildings is especially helpful in breaking the disease cycle when combined with a good system of cleaning and disinfecting. Consult your veterinary surgeon for specific recommendations on adequate rest periods for each area of your farm before the re-introduction of new animals.

12. Pest Control

- a. Pest management programmes are needed to control the infestation of pests on pig farms. Flies, rodents, birds, feral cats, insects and even domestic pets can be involved directly or indirectly in spreading disease e.g. transmission of TGE by starlings and gulls. Don't let any other animals near the pigs and keep them out of feed and bedding stores.

- b. Guarding against any contamination of feed is essential to eliminate the possibility of unapproved materials being consumed by the pigs. Fouling of feed by cats, dogs, birds and rodents can spread some diseases e.g. toxoplasmosis, salmonellosis. Entrance points in feed mixing and storage areas should be covered with screen or sealed to prevent entry by pests.
- c. On outdoor units, practical measures, such as putting rubber flaps on feeders, not only reduce disease risks but can also make considerable savings in feed costs.
- d. A professional contractor can be employed to eliminate rodents. If the task is undertaken by farm staff a plan of bait stations should be kept and a list of dates they are inspected together with a record of rodent activity and actions taken. Only approved pesticides, properly applied, should be used in pest control. Intensive baiting should be used when pens are empty. Check regularly that the pest control programme is effective. Before adding a new batch of pigs, check for rodents.
- e. The elimination of breeding, roosting, and shelter sites will aid in pest control. To assist in the control of wildlife, and rodents in particular, sites should be kept clean and free from piles of rubbish, old implements, building materials etc. Grass areas should be kept mown and weeds regularly removed. Repair buildings to prevent access and nesting and remove any refuge sites. Clear up any feed spillage promptly and cover feed barrows.

13. Preventing Injuries

- a. Pigs can be injured in many ways. Good judgement must be utilised when designing and maintaining a safe environment for the pig.
- b. During the design process, it is necessary to think about potential problem areas, such as sharp corners, smooth concrete, or improper size of openings. Existing farms should be routinely evaluated to insure that they are safe for the pigs. The producer should walk through the facilities often, noting the condition of fences, pens, and flooring and making necessary repairs. These areas will also be monitored during Farm Quality Assurance visits by your veterinary surgeon.
- c. The key to preventing injury to both pigs and employees is being observant and prompt in effecting repairs.

14. Disease treatment

- a. In spite of good preventive medicine programmes and proper care, animals may still become sick or injured. Early recognition and treatment of disease is essential to protect animal welfare and is a cornerstone of responsible medicine use.
- b. Accurate diagnosis allows selection of the proper treatment and helps in deciding what management steps, if any, are needed to prevent the spread of disease in the herd. Where the diagnosis indicates the potential for disease spread sick animals should be isolated to minimise the spread. Isolation also makes it easier to observe and treat affected animals.
- c. Whenever possible, precise diagnosis of deaths should be attempted. This allows for a more rational choice of treatment as well as identifying steps that need to be taken to protect animals that have not been infected. When the presence of a specific pathogen has been established in the laboratory, antimicrobial susceptibility (sensitivity) tests can be conducted to aid in proper antimicrobial selection. These services (including post-mortem examination of dead animals) are available through veterinary surgeons and the Veterinary Laboratories

Agency. Contact names and telephone numbers should be kept in a handy location.

- d. Sick animals should be treated promptly. When using medicines, it is essential to read and follow the label instructions. A record of the product used, dose, duration of treatment, and period of withdrawal should be kept. Treated pigs should be identified to ensure that withdrawal times are observed. A record of medicine usage is a legal requirement but it can also be useful in developing and documenting an adequate health care treatment plan. A record of the product used, dose, duration of treatment, and period of withdrawal should be kept in an accepted format such as The Pig Veterinary Society Medicine Recording book.
- e. Pigs that become ill should be isolated. Isolation slows the spread of disease to healthy pigs and allows increased care for the sick pigs. Hospital/isolation pens need to be protected from extreme weather to aid in recovery of the pig's health.
- f. Medicines that are approved to be injected into animals or added to feed or water must be used only when absolutely necessary and where relevant, on advice by a veterinary surgeon and only as recommended by the manufacturer. Such products can help ensure the health and well-being of animals and, when used strictly according to recommendations and regulations, will ensure a safe and wholesome product. Simple rules should be followed:
 - Label instructions must always be read and followed completely regarding dose, frequency and timing of use, and withdrawal intervals before marketing.
 - Treat all animals at the dose and for the duration recommended.
 - All medicines should be stored according to the manufacturers instructions. Those medicines requiring refrigeration should be identified and kept in an efficient working fridge. Temperatures within the fridge should be monitored.
 - Details of purchase, use and disposal of unused medicines should be kept.
 - Treated animals should be identified to ensure that withdrawal times are observed.
 - When in doubt, seek professional advice.
 - Do not use any product for which clear instructions are not available.
- g. Prompt and appropriate disposal of dead animals is important for animal and human health. Animal By-Products Regulations, 2003, prohibits on-farm burial and pig disposal pits. Dead animals can be a source of disease for other animals. They should either be removed immediately by a carcass collection service or completely incinerated as soon as is practical.

15. Withdrawal periods

- a. Withdrawal periods are only established after considerable research and are set for the purpose of ensuring consumer safety. The withdrawal period is the time between the last dose given to the animal and the time when the level of residues in the tissues (muscle, liver, kidney, skin/fat) or products (milk, eggs, honey) is lower than or equal to the Maximum Residue Limit. The Maximum Residue Limit (MRL) is the maximum concentration of residue resulting from administration of a veterinary medicinal product which is legally permitted or recognised as acceptable in or on a food.
- b. When medicines are used for food animals studies must be carried out to assess the time needed for any residues of a substance or its metabolites which may still

be present in an animal's body to fall below the level shown to be safe. Once this has been determined, the withdrawal period is established. The withdrawal period is the minimum time required between the last treatment and the collection of meat or milk for human consumption.

- c. The National Office of Animal Health (NOAH) includes a table of 'withdrawal periods for animal medicines' in the back of the NOAH Compendium of Data Sheets for Animal Medicines. The marketing authorisation holder must always be the absolute reference point for any information on a specific product.
- d. Authorised products have stated withdrawal periods. Where products are prescribed for a species for which it is not authorised or are used outside the data sheet recommendations e.g. the dosage is increased; the treatment period is increased; the interdose interval is shortened; the treatment is changed to another product or there is simultaneous administration of other antimicrobials by the same or other routes then the veterinary surgeon should set a withdrawal period not less than the minimum of 28 days for meat. The withdrawal period specified must be adhered to in order to ensure that food produced from treated animals does not contain harmful residues.

16. Planning and training

- a. In any area of a business, failure to plan is often simply a plan to fail. Animal health and welfare is no different and taking a proactive approach will yield direct benefits. It is recommended that a herd health plan is drawn up for every unit in consultation and agreement with its staff and its veterinary and other advisers. Health plans should identify the best ways to prevent or treat disease in the animals on the unit and to ensure their welfare. It should set clear realistic goals and outline the practical strategies to achieve these goals, including any necessary changes in farm practice. Ensure that the plan takes full account of all medicines used on the unit including those incorporated in medicated feedingstuffs.
- b. Ideally those working directly with the pigs should be directly involved in developing the health plan. Health plans are only likely to be effective if all staff agree that the targets and the strategies are practical and sensible. The resources needed to deliver the plan should be available. Wherever possible protocols and procedures should be developed that make it easier to follow the plan than not to do so. The plan must be put into practice, reviewed regularly and updated in the light of experience and progress.
- c. It is important that people working with animals can recognize when health problems occur and that they use veterinary medicines correctly. Staff working with animals need to be skilled in stockmanship, in assessing animal welfare and in the administration and safe use of veterinary medicines. Training should be provided where required. The NPTC (www.nptc.org.uk) provides independent assessment, certification and recognition of skills. Staff should be encouraged to gain the appropriate NPTC certificates.
- d. Copies of relevant regulations, Codes of Practice and training materials should be available on every unit. The Pig Enterprise interactive CD-ROM based multimedia training packages are available free of charge from the MLC (www.stotfoldpigs.co.uk). The Veterinary Medicines Directorate (VMD) Code of Practice on the Responsible Use of Animal Medicines on the Farm developed with the support of industry is a useful source of advice (www.vmd.gov.uk).

Summary

There should be regular consultation with a veterinary surgeon for help with disease prevention, control, diagnosis, and treatment. A herd health plan including vaccinations and parasite control should be developed and reviewed and updated often. Basic disease prevention and control methods should be used to the greatest degree possible.

Keep disease out

1. Source of pigs: Only buy/import pigs from herds with similar or better health status. Quarantine new pigs where appropriate.
2. Vehicles: Keep vehicles outside the farm boundary – visitors, feed delivery, pig delivery/collection, and especially CARCASE COLLECTION vehicles.
3. Pests: Control rats, mice, flies, keep birds out of buildings, avoid contact with other stock, keep cats and dogs away from pigs. Remove rubbish that provides potential breeding sites.
4. Visitors: Don't allow visitors near pigs unless essential. Provide CLEAN overalls and boots. Keep outdoor pigs away from footpaths.

Keep disease levels down and stop spread

5. Cleaning and disinfection: Thorough cleaning and disinfection between batches. Keep passages, walkways, loading ramps and trailers clean and disinfected.
6. Vaccination: Develop a vaccination programme in consultation with your vet and make sure that animals are vaccinated and receive boosters as agreed.
7. Batches: Keep batches separate, all-in-all-out or batch rear/finish/farrow wherever possible.
8. Mixing pigs: Avoid mixing pigs. Change system to avoid/reduce mixing. Don't put poor pigs back with younger ones. Adopt a "Slow track" system for casualties.
9. Implements: Keep implements separate for each group. Clean and disinfect between groups if shared - barrows, tools, tractors, instruments and farrowing house trays.
10. Water : Keep water system clean, use known safe water source, avoid watercourses for outdoor pigs.
11. Order of work: Start with youngest pigs and work up through age groups, change overalls at end of day, wash hands, clean and disinfect boots
12. Personal hygiene: Provide staff toilet with wash basin, always wash hands after use. Take care if staff have Salmonella-like infections. CLEAN and disinfect boots and wash hands between houses/groups.
13. Outdoor pigs: Rotate pasture regularly, especially weaners – every group, replace wallows regularly.

Help the pigs to help themselves

14. Colostrum: Try to make sure all piglets get enough colostrum
15. Feed: Feed an appropriate balanced diet. Keep all feed stores/bins pest proof. Clean and disinfect feed bins regularly. Only buy from certified sources. Check for spoilage and mycotoxins.
16. Environment: Eliminate draughts, provide adequate ventilation and good temperature control.

Appendix A - Antimicrobials in pig production

Treatment and prevention of disease

A1. Microbial diseases cause pain, distress and economic loss. Registered therapeutic antimicrobials reduce this suffering and distress and speed recovery in infected animals. Since the animal cannot be allowed to suffer the alternative is to kill the animal. The removal of antimicrobials from veterinary medicine would cause great welfare problems.

A2. The antimicrobials that are authorised for use in animals in the UK are detailed in the NOAH Compendium of Data Sheets for Animal Medicines published by NOAH, and in the Handbook of Feed Additives published by Simon Mounsey Ltd. Withdrawal periods for veterinary medicines are set to ensure that any residue which may remain after treatment is harmless. Information on withdrawal periods is contained as a table in the back of the NOAH Compendium.

A3. The major antimicrobial exposure in pigs occurs during the treatment of respiratory and enteric diseases of pigs. The next most common conditions for which antimicrobials are used are periparturient problems including mastitis and metritis and lameness. A wide range of antimicrobials is used in the treatment of bacterial diseases in pigs. Treatment of groups of animals is generally only undertaken after diseases known to affect whole groups have been identified in a proportion of the group. This is particularly true for pneumonia and swine dysentery. Veterinary surgeons will usually take a range of other factors into account before deciding to prescribe antimicrobials for the entire group e.g. severity of disease in affected animals, prevailing weather conditions, housing conditions and other forms of medication.

A4. Therapy usually involves an individual animal or group of diseased animals. Antimicrobials, used responsibly, are an essential element in the fight against animal disease. However, in animals, as in humans, a proportion of those treated for infectious disease could recover without antimicrobials but at the expense in many cases of welfare and productivity.

A5. Antimicrobials are sometimes used to treat a group of animals to prevent diseases that might occur. In some situations when the proportion of animals diseased during a defined time period reaches a threshold value, all animals in the group are medicated as the probability of most or all of the animals getting infected is high.

A6. In both treatment and prevention the medicine is administered over a defined, preferably short, period of time and is prescribed by a veterinary surgeon. Use for prevention is avoided whenever possible but may be necessary mainly during periods when stress is imposed on animals e.g. changes in diet, weaning, transport and mixing.

A7. Antimicrobials help prevent the spread of infection by reducing the bacterial burden in infected animals and may reduce zoonotic disease by reducing bacterial contamination in the food chain at source.

A8. Antimicrobials are administered by the most convenient and effective routes. If an individual pig is suffering from a bacterial disease it is usually treated with a course of injectable antimicrobials. If large groups become infected, individual treatment usually is not feasible and mass oral medication is the only practical

method of treatment. Excessive handling can be stressful for the pigs so medication included in feed or water reduces distress and handling. Examples are the use of medicated feed or water to prevent the occurrence of respiratory problems when young animals are regrouped or colibacillosis during the post-weaning period in pigs.

- A9. A review has been published of the diseases of pigs most commonly requiring treatment including treatment with antimicrobials (Bennett R.M., Christiansen K.H. and Clifton-Hadley R.S. (1999) Direct costs of endemic diseases of farm animals in Great Britain. *Veterinary Record* (1999) 145, 376-377.) The authors of the review admit that the availability of appropriate disease data was a limitation on the estimation of the direct costs associated with each disease. In addition only the direct costs associated with the impacts of disease on livestock production were considered and not wider economic impacts, such as the implications for human health, animal welfare and the effects on markets, including international trade. The data presented are the best present day estimate available but demonstrate the potential economic impact of disease on the industry and an indication of the costs of control. The estimates also indicate the likely scale of detriment to the welfare of pigs if antimicrobials were not available for treatment.

Antimicrobial zootechnical additives

- A10. Antibiotics, other than coccidiostats and histomonostats, may not be used as feed additives from 1 January 2006, (Regulation (EC) No 1831/2003). When antimicrobials were used as zootechnical additives they were used at low levels. Some resistance might develop to the antimicrobials used even at these levels but at a much lower frequency than if they were to be used at treatment rates. Only antimicrobials that were not of value in human or animal treatment were authorised for use as zootechnical feed additives in the EU. Strict regulations on the use of antimicrobials as zootechnical feed additives required companies to demonstrate that they met the following standards:

- They must be non toxic.
- Performance must be improved with economic benefit.
- There must be no adverse effects in relation to other antimicrobials.
- They must not alter the bacterial flora in the gut, or allow one organism to predominate over another, for example, salmonella.
- They must not pollute the environment.
- They must not increase drug resistance

- A11. The main primary effects of zootechnical feed additives were:

- Improved feed conversion efficiency
- Improved growth rate

The following modes of action have been suggested:

- there is a general nutrient saving outcome as a result of effects on nutrient breakdown, nutrient losses and nutrient absorption e.g. lowered breakdown of easily fermentable nutrients, restriction in breakdown of essential amino acids.
- effective against micro-organisms associated with growth suppression
- maintain a more effective and absorptive gut lining.

- absence of disease increases capacity to grow. Disease generally decreases appetite and has a general catabolic effect (tissue breakdown).
- A12. When antimicrobials were used as zootechnical additives they were incorporated at low concentrations (2.5 ppm to 50 ppm according to compound). Their use increased average daily growth and food conversion ratios by 3 per cent to 11 per cent. While antimicrobials for therapeutic use are available as authorised medicated pre-mixes, antimicrobial feed additives were generally available to livestock producers from feed manufacturers (Zootechnical Feed Additives), without veterinary prescription.
- A13. The effectiveness of antimicrobials as growth promoters has been clearly documented in the literature. A summary of UK data on growth promoters (Muirhead and Alexander, 1997) showed the following:
- Improvements in average daily gain of up to 4%.
 - Improvements in average daily feed intake by 0.2% - 1.4%
 - Improvements in feed conversion rate by 2.5% - 3.9%
- An analysis based on the conservative assumption that antimicrobial growth promoters were improving feed conversion rate by an average of 2.5% over a pig's lifetime and reducing mortality by 0.6% showed that a complete ban on growth promoters would cost the UK pig industry £14.7 million equivalent to a reduction in gross margin of £1 per pig. However, this did not include fixed costs or the costs resulting from disruption to the industry.
- A14. The only antimicrobials authorised to be used as zootechnical feed additives in pigs in the EU until 2006 were avilamycin, flavophospholipol and salinomycin. A MAFF review concluded that the use of avilamycin, bambarmycin, monensin and salinomycin does not appear to induce or co-select mutants with cross resistance to medical therapeutics. The authorisation to use bacitracin zinc, spiramycin, tylosin and virginiamycin as feed additives was withdrawn by the EU Council from the 1st January, 1999, although their use was authorised until 30th June 1999. The authorisation to use carbadox and olaquinox as feed additives was withdrawn by the EU Council from the 1st January, 1999, although their use was authorised until 31st August, 1999.
- A15. To address medical and public concerns about the use of these compounds FEFANA (the European Federation of Feed Additive Manufacturers) and a number of EU Member States funded (1998 - 2001) a detailed survey on resistance patterns in intestinal bacteria from the major food species in a number of European countries. The results of this research and various other initiatives in this area should provide sufficient information to develop an adequate risk assessment of this issue.

International perspective

- A16. Resistance to antimicrobials is an international problem. Action by the EU on the basis of the precautionary principle cannot be enforced internationally. Imports of meat and dairy products from outside the EU may therefore come from animals that have been exposed to antimicrobials that are not authorised within the EU. There should be harmonisation of rules governing the use of medicines internationally.

Appendix B – Pig Veterinary Society Guidelines For The Use Of Antimicrobials In Pig Medicine

B1. Responsibilities

Whilst the immediate responsibility of the prescribing veterinary surgeon is to safeguard the health and welfare of animals under his care by controlling disease outbreaks and by reducing the overall level of disease within the herd they must be aware of the hazards that this presents and show a continuous responsibility to the consumer by reassessing the risk and reducing it wherever possible.

An accurate specified diagnosis should be made leading to the selection of the most appropriate choice of medication. Previous or current bacteriological sensitivity testing together with records of previous responses must be a component of a balanced decision.

There must be a commitment to Continuous Professional Development to ensure the maintenance of the depth of knowledge of all therapeutic agents.

B2. Farm Guidelines

There should be written instructions on each farm outlining the farmer's obligations in law concerning his use of medications including antimicrobials. It should cover:

- Storage
- Administration techniques
- Recording
- Withdrawal periods

Part of the instructions should be specific to the farm including:

- The correct dosage and duration of medication
- The correct circumstances of use
- The correct procedures for observing withdrawal periods

All of which is to ensure the accuracy of medication of animals at the anticipated site of infection.

B3. Integration with Preventative Medicine Programme

These written instructions should be in conjunction and co-ordination with a written Preventative Medicine Programme tailored to meet the needs of the farm and emphasising those areas of management that are likely to reduce the requirement to use medication.

B4. Review

There should be a written procedure for a regular periodic review of the medication prescribed to provide the opportunity to reassess the efficacy of treatment (treatment = medication + management) after this review, and where appropriate. Medication should either be stopped or reduced in duration.

Any suspicion of adverse reactions or evidence of bacterial resistance should be thoroughly investigated through the support of In vitro bacterial sensitivity testing with the medication changed appropriate to these findings.

B5. Practice Policy

All available practice information should be consolidated into one form or database, such that this centralised information should:

- Allow monitoring of the level of medication used
- Contain a list of those drugs permitted for use on each farm
- Contain a list of drug withdrawal and a system for allowing information to be updated
- A record of antibacterial sensitivities
- Any comments concerning the response of medication under these circumstances

B6. Population Medicine

Where the health and welfare of animals is being safeguarded by the medication of a population the aim should be:

- That it is used strategically
- That it encompasses the smallest population
- It is used for the shortest effective duration

Where this population includes animals not clinically affected, i.e. subclinical or healthy, it must be justifiable either on the grounds of the protection of the susceptible or by the reduction in the excretion of pathogens capable of producing or perpetuating clinical disease.

Where such diseases are endemic all aspects of treatment (medication + management) should undergo a regular routine reassessment.

B7. Fluoroquinolones

Fluoroquinolones antibiotics have an important place in the therapeutic armoury for serious diseases of both animals and humans. The use of this class in both human and veterinary medicine has produced particular debate and the following guidelines for use should be followed.

- Fluoroquinolones should only be used therapeutically not for routine prophylaxis or growth promotion
- They should be used where clinical experience or sensitivity testing indicates suitability. Ideally sensitivity testing should take place prior to or in parallel with use.
- The legal guidelines for prescribing POMs including the cascade should be fully followed.

B8. Veterinary Health Planner

The Pig Veterinary Society has published a Veterinary Health Planner and it is available to members through its website. The plan allows diseases known or thought to be present on the farm to be recorded along with outline preventative measures and the treatments prescribed by the vet. Key measures of performance can be tabulated. Cleaning programmes can be noted and staff training requirements identified.

The Responsible Use of Medicines in Agriculture Alliance (RUMA) was established in November 1997 to promote the highest standards of food safety, animal health and animal welfare in British livestock farming.

A unique initiative involving organisations representing every stage of the food chain process, RUMA aims to promote a co-ordinated and integrated approach to best practice.

RUMA
Acorn House,
25, Mardley Hill,
Welwyn,
Hertfordshire,
AL6 0TT

Tel/Fax: 01438 717900
Email: info@ruma.org.uk
Website: www.ruma.org.uk

RUMA is made up of the following organisations:

Agricultural Industries Confederation (AIC)
Animal Health Distributors Association (AHDA)
British Poultry Council (BPC)
British Retail Consortium (BRC)
British Veterinary Association (BVA)
Linking Environment and Farming (LEAF)
Meat and Livestock Commission (MLC)
National Beef Association (NBA)
National Consumer Council (NCC)
National Farmers Union (NFU)
National Office of Animal Health (NOAH)
National Pig Association (NPA)
National Proficiency Test Council (NPTC)
National Sheep Association (NSA)
The Royal Association of British Dairy Farmers (RABDF)
Royal Pharmaceutical Society of Great Britain (RPSGB)
Royal Society for the Prevention of Cruelty to Animals (RSPCA)