CHAPTER 11

INTENSIVE PIG HOUSING

Introduction

11.1 The Australian Pig Industry Policy Council submitted to this inquiry that in contrast to the relatively poor conditions under which many pigs were kept in the past under low cost, extensive and semi-intensive systems, intensive pig husbandry offers many advantages both to producers and their animals. It also has provided significant benefits to consumers in the form of regular supplies of cheaper, better quality products.[1]

11.2 Apart from providing a greater degree of management and financial control over the end product and an improved capacity to meet ever more exacting consumer demands for meat quality and value for money, intensive pig husbandry has made it possible to introduce significant improvements in pigs' environments. Cleanliness, lack of diseases, more stable temperatures and humidity levels and a general lowering of stress on animals have all contributed towards improved conditions for pigs which, in turn have been reflected in better productivity performances.[2]

Industry View of Welfare Criticisms

11.3 The industry claims that most criticism of pig production in Australia is without foundation, that there is little evidence of ill treatment of animals, and that almost all the pigs produced in Australia are produced within the guidelines laid down in the Code of Practice.[3] From a practical point of view, the industry firmly believes in the need to actively promote animal welfare as a means of ensuring high levels of livestock productivity and the profitability of the industry. Animal welfare and sound piggery management are inexorably linked.[4]

Australian and New Zealand Federation of Animal Societies Concerns

11.4 ANZFAS is very aware that its criticisms of intensive systems are often dismissed as ill-informed if well-meaning anthropomorphism and has therefore presented a closely argued scientifically based (physiological and behavioural) presentation of the issues to this Committee. It argues for the importance of objective scientific assessments of suffering and is concerned about those people who think that physiological measures will provide definitive answers in the welfare debate:

> While physiological measures might be welcomed by some because of their supposedly quantifiable nature, they also have limitations and it is easy to overestimate their reliability relative to behavioural data. Two points must be borne in mind:
>
> 1) Physiological parameters such as levels of adrenal hormones can be accurately measured, but so can behaviour ...
>
> 2) The interpretation of behavioural data is difficult, that is, we do not know exactly how particular behaviour reflects the subjective feelings of animals. Exactly the same problem exists with regard to physiological data. As indicated above, even a relatively simple measure such as adrenaline level cannot be interpreted unambiguously.
>
> Certainly physiological evidence can make a useful contribution to the welfare debate. However, it should not be given greater weight than other sources of information. We return to the need to gather converging evidence via many different approaches as the most reliable indicator of suffering.[5]

11.5 ANZFAS is critical of the Model Code of Practice for Pigs for several reasons the overriding criteria being that although the Code claims to recognise that the basic requirement for the welfare of pigs is a husbandry system appropriate to their physiological and behavioural needs the most basic behavioural needs of pigs are not acknowledged.[6] It makes the

point in this context that in the light of research findings over recent years and "the undertaking in the preface to the Code that it should be reviewed to take account of advances in our understanding of animal physiology and behaviour" a review is overdue.[7]

11.6 ANZFAS argues that although specifying the basic needs of pigs it:

- nevertheless allows accommodation which causes injury to feet and joints and recommends a grossly inadequate space allowance;

- acknowledges that tethers are detrimental to the welfare of sows, but accepts that sows may be kept in this system;

- acknowledges that "vices" such as tail biting are management problems but accepts surgical "solutions" such as tail docking.[8]

11.7 ANZFAS claims that many of the practices accepted within this Code are being questioned in European countries because close confinement does not meet any reasonable welfare criteria.[9]

11.8 ANZFAS submitted to this inquiry that by several different criteria close confinement causes stress to pigs and recommended that the following be provided by statute:

1) No further construction of dry sow stalls to be permitted.
2) Tethering to be banned immediately.
3) Dry sow stalls to be phased out over a period of 5 years.
4) Wire cages for piglets to be phased out over a period of 5 years.

5) Farrowing crates to be phased out within 5 years, and research to be undertaken immediately into humane alternatives.
6) Within a maximum of 5 years, all pigs to have access to an outdoor run adequate to satisfy physical and behavioural needs.
7) Educational material and courses to be provided for farmers to produce the level of stockmanship required for loose housing of animals.
8) All pigs to have access to appropriate rooting materials.
9) All pigs to have sufficient bedding to provide comfort and to protect them from physical injury.
10) All farrowing sows to have access to nesting material.
11) All pigs to live with others of their species in stable social groups in such a manner as to permit continuing physical contact.
12) The lying area available to each adult pig to be no less than 3 sq m, with no less than 1 sq m for each growing pig.
13) Minimum feed requirements for pigs of different body weights should be stipulated, including not only nutrient requirements, but also the bulk to satisfy feeding motivation.
14) Suitable feeding arrangements to be made to limit feed competition.
15) All pigs to be protected from predators, extremes of temperature and the elements.
16) Castration, teeth clipping, ear notching and tail docking of piglets to be prohibited. Tail biting and nibbling of the sow's belly and litter mates, are essentially management problems and should be treated as such.[10]

11.9 These recommendations stem from physical and behavioural considerations based on the belief that the behaviour of the modern pig's ancestor was genetically adapted to survive under extreme conditions. Since it is most unlikely that genetic change in the behavioural needs of the pig in keeping pace with the rapid changes in the environment of the intensive farm many aspects should be phased out.[11]

Confinement Housing

11.10 Intensive housing may cover a wide range of building types but they all seek to provide an insulated living space in which temperature, ventilation, bedding etc. can be wholly or partially controlled by the producer. Most pigs in Australia are now produced under conditions where temperature, humidity and ventilation are all controlled to some degree.[12]

11.11 Various forms of accomodation are used, all of which try to minimise housing costs while maintaining an adequate environment for efficient food use. All pigs, sows, boars, weaned, growing and finishing pigs live in a barren environment. The physical dimensions of their living space, their companions, the stocking rate and the feed type are all tightly controlled. They are commonly put together in groups of the same age, sex and weight. In this situation they have to learn to recognise feed, water and dunging sites and to fit into a social hierarchy. Various behaviours are shown as this hierarchy develops. Newly mixed pigs will fight to establish a linear hierarchy. Fighting may be intense for up to 48 hours after mixing and will continue intermittently thereafter. The social rank which develops as a result of fighting usually reflects the weight of individual pigs within it - the heaviest being most dominant, the smallest least dominant.[13]

11.12 The majority of units in the pig industry are small enough for one or two people to manage. For example in the whole of Australia there are only about 16 per cent of units that have more than 500 sows. Units of this size require three or four people to ensure proper supervision and care.[14]

11.13 The NSW Department of Agriculture submitted the following general recommendations on housing to this inquiry:

> Any system which allows for individual feeding is preferred over group feeding.
>
> Intensive housing is preferred, in that it is easier to provide an optimum environment, in which the pigs grow better.
>
> In general, the more freedom the pig is given, the greater the managerial skills required. Pigs confined in groups outdoors tend to destroy their own environment (including soil erosion) and both indoors and outdoors are subject to bullying and inequities in feed distribution.
>
> Since Departmental officers are not always in a position to assess management skills, they must recommend a system which will give good results in the hands of most people, i.e. individual housing, individual feeding. Stalls are recommended in preference to the tethers, again because a higher degree of managerial skill is required when tethers are used.
>
> These recommendations may be modified depending on the circumstances, and on the assessment of an individual producer.[15]

Pig Welfare Research in Australia

11.14 Community concern has led to some concentration of research effort to quantify, objectively, the alleged stressful effects of confinement housing on pig welfare, and to compare alleged beneficial effects of one system to another. Research sponsored by the industry through the Australian Pig Research Council, in relation to the size of the industry, is quite

extensive by world standards. Current (1989/90) funding of research will exceed $3 million, of which approximately seven per cent will be dedicated to projects directly related to pig welfare.[16]

11.15 The Pig Research Council is a Commonwealth advisory body which has the primary function of advising on pig research and development and approving payment of money from the Pig Research Trust Fund (producer levy). The overall mission of the Council is to sponsor the development, dissemination and adoption of innovative research and technology which will improve the viability, efficiency and competitiveness of the Australian pig industry. The following pie chart gives an indication of priorities in 1987-88.

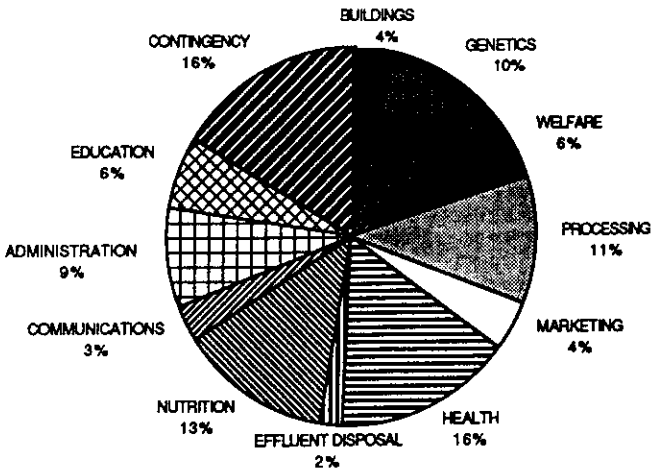

Figure 1

SOURCE: Pig Research Council Annual Report 1987-88 p.3

Research projects specifically related to pig welfare and supported by the Australian Pig Industry Research Committee and the Australian Pig Research Council

Project	Title	Date completed
DAV 24	The effect of intensive and free-range conditions on the physiological and behavioural responses associated with welfare status in the pig.	1982
DAV 39	The influence of intensive housing and stress responsiveness on the welfare status and productivity of breeding sows.	1986
UQ 4	Social stresses in growing pigs.	1983
UQ 8	Commercial piggery design in relation to sow behaviour.	1984
UQ 9	Design of space in pig housing with consideration for behavioural consequences, stocking rates and group sizes.	1986
US 11	Gastric ulceration and digestive function.	1984
UM 19	The effect of different types of "toys" on the social behaviour and growth of weaner pigs.	1983
UM 22	Motivation of pigs to perform behaviour patterns frustrated by an intensive environment.	1985
DAV 48	Behavioural limits to high reproductive efficiency in pigs.	1987
DAV 55	Farrowing accommodation: the effects of design on behavioural patterns related to improving performance and welfare.	1990
UM 25	Ethological needs of farrowing sows.	1988
DAV 61	The welfare of sows: improving the design and utilisation of dry sow accommodation.	1989
UNE 9	Automated electronic feed stations for dry sow management in Australian piggeries.	1989
DAW 16	Preslaughter handling of pigs and its effect on yield and meat quality.	1987
DAV 65	Fear of humans by pigs and its relationship to the attitudinal and behavioural profiles of stockpersons.	1990

Project	Title	Date completed
UWA 15	Water turnover in pigs in the transport/abattoir environment.	1990
UQ 13	Development of a salivary cortisol method for measuring changes in the plasma free cortisol in the pig.	1988
UM 35	Adaptation and the welfare of confined pigs.	1991
UM 36	Freedom of the farrowing sow.	1991
DAV 82	The welfare of sows: methods of mixing to minimise aggression and injury.	1992

Index to project codes:

DAV Department of Agriculture and Rural Affairs, Victoria
UQ University of Queensland
US University of Sydney
UM University of Melbourne
UNE University of New England
DAW West Australian Department of Agriculture
UWA University of Western Australia

SOURCE: Pig Research Council, tabled document. Public hearing Canberra, 23 October 1989.

11.16 In the main past Australian projects sought to establish objective measurements of "stress" in housed pigs, particularly in systems of confinement. As well there was research on methodology which might be used to "improve" the conditions under which pigs are housed. Future research will seek to establish the elements of management and housing that could further improve pig welfare.[17]

Intensive Housing and Environment

11.17 Indoor pig housing is designed for four distinct phases of production: the period of pregnancy; farrowing and rearing; weaning and feeding.

Sow Housing

11.18 Community concern about confinement housing of pigs has concentrated on the condition (adverse or otherwise) said to pertain for housed sows. The concern stems from the belief that confinement for long periods (the breeding life of a sow in a herd may be as long as four years) will be stressful.[18]

11.19 Under intensive conditions, the sow has little opportunity to exhibit the behaviour patterns which occur in more natural situations before and during parturition. The extreme restlessness commented on by many workers has led to a re-evaluation of the type of accommodation provided for this time, but has not led so far to any changes in common commercial practice. It has been suggested, for example, that an increase in farrowing space might lead, under certain conditions, to a reduction in piglet mortality, but producers are wary of change because of the costs involved in providing efficient and humane farrowing accommodation.[19]

11.20 Confinement systems for sows vary both as to reproductive status (pregnant, lactating, weaned/unmated) and feeding/resting methods.

11.21 There are four main systems for keeping dry sows:

- open range grazing with group-feeding,
- groups run in paddocks with individual feeding (for example, in sow stalls),
- groups run in concrete pens with individual feeding stalls, and
- dry sow stalls.

Farrowing sows -

- individual pen, confined to stall
- individual pen, confined by tether
- individual pen/house, not stalled or tethered.

Gilts -

- group housed
- individually stalled or tethered.[20]

11.22 It is estimated that 15 - 20 per cent of sows spend a proportion of their productive life in extensive (paddock) conditions.[21] The rest are confined continually.

The Open Range System

11.23 Sows grazing green crop or pasture, and supplemented with dry feed, will do well under this system. It is possible to run 12 sows/hectare with electric fencing.[22]

Group Run - Individual Feeding

11.24 The NSW Department of Agriculture suggested in its Agfacts 1982 that ideally, the best system is to group-run sows in concrete pens and feed them individually. (AGDEX 441/720)It is an excellent system, but very expensive to set up. Sows stalls are at the front of the pen. The back area is an open concrete pen with a slope towards the back wall. A mesh covered drain, 0.5 m wide, runs along the back wall. The concrete floor should have 50 to 75 cm fall to the drain. Allow 3 sq m of floor space for each sow in the pen. This is a wash-down system and is labour intensive.[23]

Dry Sow Stalls

11.25 This is probably the most common method of keeping sows intensively. Once sows are mated they are generally housed in stalls which measure 2.15 metres long and 0.60 metres wide. The stalls are constructed of pipe or round steel. Sows enter from the rear and, depending on the construction can exit either from

the front or rear. The rear of the stall is slatted most often with concrete or pipe clay slats. Water is provided in a trough at the front and feed is supplied daily. Sows remain in the stall for most of the gestation period. The stalls are located in sheds with natural ventilation being the norm. A water trough is usually placed in front of the sow. She is fed either on the trough or on the floor behind the trough. Concrete keeps the sows' hooves in good shape. Mesh is the next best, followed by hardwood timber. Stalls with mesh floors stay cleaner than stalls with concrete or timber floor. The dry sow stall can have either a chain or gate at the back to keep the sow in.[24]

11.26 By using stalls producers are able to maintain sows in the correct condition for farrowing. Overfeeding can result in difficult farrowings and reduced feed intake during lactation. Reduced feed intake during lactation means sows can wean in poor condition. This creates managerial difficulties in the future gestation periods.[25]

11.27 Stalls permit the animals to be checked daily for any sickness or managerial problems.[26]

11.28 The environment in dry sow sheds does not have the extremes found in extensive systems.[27]

11.29 The NSW Department of Agriculture and Fisheries recommends that dry stalls is the first preference but other systems are acceptable if sows are group run and individually fed or electronic sow feeders are used. Systems other than dry stalls have more managerial inputs, can be costly, and have deleterious effects on the sow's well being. There is less control with most of the alternatives.[28]

Dry Sow Tethers

11.30 Under this system sows are tethered either by the neck or the girth in half stalls. These stalls are 0.6 metres wide. The sows are able to lie close to each other at the rear end. The neck tether consists of light chain with a cover to protect the animal at the top of the neck. Sows are tethered for the full gestation period.[29]

11.31 The NSW Department of Agriculture submitted that less than five per cent of sows are kept in tethers in New South Wales and that in recent years tethers have not been installed.[30]

11.32 The Department considers that provided tethers are checked regularly and are correctly fitted with quick release collars there is no evidence that replacement is necessary or need be recommended. It prefers dry sow stalls due to the ease of management.[31]

Dry Sow Pens

11.33 In some intensive piggeries sows are kept in small groups (6-10 sows) in large pens 8 to 12 sq metres in size. They remain in these pens for the full gestation period. Where possible producers try to keep compatible sows together. Young sows tend to be more compatible.[32]

11.34 The major disadvantage with this system is that bullying of sows can occur. This bullying can lead to the sow aborting her litter.[33]

11.35 It is very difficult to maintain the correct level of feeding according to the sow's condition. The bullies get the most feed. Checking for the health of the animal can be difficult under this system.[34]

11.36 The NSW Department of Agriculture and Fisheries submitted that most intensive alternatives are more expensive, but give greater control over feed intake and eliminate bullying. Where cost of establishing a piggery is a factor the will suggest the practice, but explain its limitations. A high degree of supervision is required.[35]

Farrowing Systems

11.37 A farrowing stalls is a frame approximately 2.1 metres long and 0.6 metres wide in which a sow is placed prior to farrowing and remains in it until her piglets are weaned, usually at between 3 and 4 weeks. Water is available at all times and feed comes from a self feeder or is provided once or twice daily.[36]

11.38 At the rear of the stall there is a small slatted area. The farrowing stall is situated in a pen of approximately 3.5 sq metres. Within this pen provision is made for the suckers to keep warm, dry and free from draughts.[37]

11.39 The purpose of a farrowing stall is to prevent the young pigs from being crushed by the sow.[38]

11.40 Farrowing stalls come with various designs - prong, adjustable bars, hydraulic rails and anti crush rails.[39]

11.41 The NSW Department of Agriculture and Fisheries submitted that stalls have been in operation for over a quarter of a century in New South Wales and that today in excess of 95 per cent of sows would farrow in farrowing stalls.[40]

11.42 The Department reported that prior to the introduction of farrowing stalls losses due to crushing were of the order of 10-15 per cent. Well managed piggeries can reduce their losses due to crushing to below 5 per cent.[41]

11.43 Alternative approaches prior to the introduction of farrowing stalls included the following farrowing systems:

(1) Ruakura Round House
(2) A Frames
(3) Large pens with crush rails
(4) Nests
(5) Sloping Floors

11.44 The NSW Department of Agriculture and Fisheries submitted that all of these systems are considered satisfactory but they require more space, are costly and the survival rates are below those of the farrowing stall.[42] To date alternatives systems have not achieved the same level of efficiency. Mortalities would be higher if farrowing stalls were eliminated. Farrowing stalls have proved to be the most successful method for reducing losses of baby pigs.[43]

Conclusion

11.45 The Australian Pig Industry Policy Council submitted that the majority of sows are kept in groups ranging in size from eight to 40, that bullying can sometimes be a problem with this system as can uneven distribution of feed between sows, and that both stalls and tethers were developed so that sows could be given individual attention, fed individually, and protected from more aggressive sows.[44]

Weaner Pig Accommodation (5 kg - 2.5 kg)

11.46 When young pigs are weaned from the sow, they are placed into weaner cages, or pens with kennels. The area of a pen is usually 2.25 to 3 m^2. The stocking density varies from 0.11 m^2/pig at the lighter weights to 0.2 m heavier weights. The accommodation is provided in specialised weaner sheds or is incorporated in grower or farrowing sheds.[45]

11.47 Cages are usually placed 30 cm above floor level with drains placed in strategic locations, or cages can be placed above (usually about 1 metre) grower pens.[46]

11.48 Pens with kennels are at ground level with a dunging area provided. Water is provided at all times and provision is made for self feeders. Where specialised weaner accommodation is provided, it includes a controlled environment system to maintain temperature between 24^{o} - $28^{o}c$.[47]

11.49 The NSW Department of Agriculture and Fisheries submitted that the introduction of special weaner accommodation has resulted in higher survival rates. This is due to the environment being closer to their needs, better hygiene, improved watering and feeding facilities. In New South Wales 95 per cent of all weaners are housed in this form of accommodation. The Department has no preference for either cages or kennels in pens provided the weaners are kept in a near optimum environment.

11.50 Alternative weaner accommodation are grower pens, open fronted sheds and yards, and paddocks.

11.51 The NSW Department of Agriculture and Fisheries submitted that if the industry had to revert back to the alternatives slower growth, higher disease incidence and greater mortalities would be the consequence.[48]

Grower Pig Accommodation

11.52 When removed from weaner pens growing pigs are normally transferred to pens approximately 1.5 to 1.8 metres wide and 3.6 to 4.2 metres long. At the rear of each pen is a 1.2 metre slatted drain. Usual stocking rates are 0.32 m^2/pig at the lighter weights to 0.65 m^2/pig at the heaviest weights. The pens are located in enclosed sheds which vary in size depending on the

size of the piggery. The pigs have access to self feeders. The pigs are fed daily when not on self feeders. This feeding is either manual or by means of automatic feeders. The pigs have direct contact with other pigs through open sided or mesh walls. The sheds in most cases are naturally ventilated.[49]

11.53 The NSW Department of Agriculture and Fisheries estimates that in New South Wales 90 per cent of pigs are raised in pens within enclosed or partly enclosed sheds.[50] The Australian Veterinary Association estimated that nationally in excess of 98 per cent of all growing pigs are raised in confinement.[51]

11.54 The NSW Department of Agriculture and Fisheries submitted that experience has shown that pigs raised under these conditions grow much quicker (in excess of 800 grams daily) compared to extensive systems. The method allows for better management and supervision and lower disease incidence. The environment is superior to the extremes of an extensive system.[52]

11.55 Alternative sytems are open range or outside runs in conjunction with open fronted sheds. The NSW Department of Agriculture and Fisheries submits that these systems require a higher level of management, are economically inferior and have a higher disease incidence. 'The price of pigmeat would have to rise considerably to compensate for the higher operational costs of alternative systems'.[53]

11.56 The NSW Department of Agriculture and Fisheries submits that the rearing of grower pigs in intensive sheds is the most viable and practical means of pig production.[54]

Stocking Density

11.57 The model Code of Practice states that it is not possible to relate stocking density to welfare in a simple manner. Adequate welfare involves consideration of group size, pen size, age, breed, temperature, ventilation, lighting and

other husbandry factors. The observance of any particular stocking density on its own cannot ensure the welfare of pigs. the suggested minimum space allowances in housed pigs based on contemporary techniques are shown in Table 11.1.[55]

Table 11.1: Maximum Recommended Stocking Densities for Housed Pigs

Systems	Minimum space allowance m^2 per pig	Comments
Growing pigs up to 10 kg in groups.	0.11	Approximately 20 to 30 per cent of space allowance provides for a dunging area.
11 - 20 kg	0.18	
21 - 40 kg	0.32	
41 - 60 kg	0.44	
61 - 80 kg	0.56	
81 - 100 kg	0.65	
Adult pigs in groups	1.4	
Adult pigs in individual stalls	0.6 x 1.8 m	
Boars in pens used for mating	6.25	Minimum length of shortest side 2 m.
Lactating sows and litters:		
- stalls	3.2	With piglets up to 4 weeks of age.
- individual pens	5.6	
- multisuckling groups	5.6	For each sow and litter.

(Conversion factors: 1.0 m^2 = 10.8 ft^2; 1.0 kg = 2.2 lb; 1 m = 39.4 in)

Contentious Issues

11.58 The pig industry view on contentious issues is that:

- Current knowledge of the pigs behavioural and physiological responses to different housing systems does not support the contention that confinement systems are less desirable from a welfare point of view than group housing. There is experimental evidence to show that tethers do not necessarily result in poor welfare and that group housing - even when used in accordance with accepted codes of practice - does not necessarily ensure adequate welfare.

- Experimental evidence also suggests that even if given the opportunity to exercise sows prefer to rest and that the provision of an exercise area for domestic sows does not ensure that they will use it.

- All of these housing systems have their advantages and disadvantages. In all cases management or stockmanship is far more important from a welfare point of view than the choice of a particular system.[56]

11.59 ANZFAS's view on contentious issues can be summarised as follows:

Physical Conditions

11.60 ANZFAS cites evidence to support its view that intensive housing results in considerable wounding and structural damage to pigs. Lack of exercise and hard surfaces combine to produce a variety of foot and joint problems and while the badly damaged ones are culled "... more animals are likely to be affected, not severely enough to be killed, but generally enough to be suffering pain". Hard surfaces also lead to leg and teat wounds, especially among piglets.[57]

11.61 ANZFAS submits that these afflictions are detrimental to the welfare of pigs and could be overcome if more suitable housing, with the following features, was provided:

- sufficient space to allow each pig to walk freely;
- as a minimum, group housing and bedding material to motivate activity;
- where concrete rather than earth surfaces are used, sufficient bedding to prevent skin wounds; and
- sufficient space for a separate dunging area to maintain clean bedding.[58]

Behavioural Aspects

11.62 ANZFAS submitted that:

- there is no doubt that sows in individual stalls develop stereotyped behaviour, which researchers classify as abnormal and indicative of unsatisfactory husbandry practices. Stereotypes may have different causes. One such cause has been identified as inadequate feeding. Even if the concentrated rations are satisfactory from a nutritional and caloric point of view, they are quite alien to the pig's natural diet. Frustration and the resultant stereotypes can be reduced by providing more fibre (such as straw) to give a feeling of satiation and to extend the time actually spent eating, which as Rushen reported, involves many hours in the wild. Even more importantly, the strong oral/nasal exploratory needs of the pig must be satisfied either by providing earth or straw in enclosures. Barren and confined individual stalls do not meet these needs, and this frustration is expressed by limited and repetitive behavioural sequences largely involving the snout.[59]

- 'Both stall and tether systems fail to meet certain welfare criteria to which we attach particular importance. As a result of their design the animals housed in them are prevented from exercising and from displaying most natural behaviour patterns; in the wide range of systems seen by members there was a little scope to reduce the continuing stress which can be caused by confinement in these systems.'[60]

- Although the farrowing crate offers some protection to piglets, it does not prevent a quite significant number still being crushed by the sow. In the confined and barren space of the crate, piglets may learn restlessness which is detrimental to the survival of their own litters later in life. This restlessness is exacerbated by the frustration of the sow's strong nest building instinct. Thus, for several reasons the farrowing crate is not a satisfactory form of accommodation.[61]

- The problem of aggression in grouped housed pigs, therefore is not insoluble. Pigs must have the opportunity from an early stage to freely interact with others to learn appropriate social behaviour. They must have sufficient space to demonstrate the recognition and avoidance behaviours which regulate aggression. Finally, feeding arrangements must be carefully designed to minimise competition.[62]

- From a welfare point of view the family pen is clearly successful. Pigs can move freely and express their instinctive behavioural needs. No abnormal behaviour is observed, and the incidence of aggression, disease and lameness is low. The stress of social disruption is avoided. Piglets can be introduced to solid food gradually and show no signs of the diarrhoea sometimes seen in piglets weaned at

three weeks of age (Lawrence, personal communication). The pen is also successful from a productive point of view. Ninety-three per cent of sows conceive while still lactating. They average 2.32 litters per year, with a mean of 11.2 liveborn piglets per litter. The food conversion ratio in these piglets is similar to intensive systems.[63]

- The space allowance in group pens is another factor influencing aggression. Aggressive encounters among growing pigs decreased as space allowance increased in the study by Ewbank and Bryant (1972). Jensen (1984) also shows that inadequate space produces more agonistic interactions among sows. He compared sows in group pens with either 3sq m per pig (deconfined) or 2.25sq m per pig (semi-confined), or individual stalls (confined). Interactions in general declined as space declined, but aggression increased. Ninety per cent of the interactions between the confined sows involved three behaviours. There was no head-head knock, nose-nose and nose-body, the first two of which are threat behaviours. There was no anal/genital nosing (recognition behaviour) or retreat (submissive behaviour). Comparing the group pens, the threat behaviour of head-body knocks was five times more common in semi-confinement than deconfinement. The submissive behaviours of head-tilt and retreat were three times more common in deconfinment. As Jensen (1987, p. 100) concludes, sows must have enough space to be able to carry out recognition and avoidance behaviour, which strengthen the dominance order and regulates aggression.[64]

11.63 These points reflect the debate about intensive housing and the studies which have been undertaken. They highlight the concerns and the complexities.

Comparative Analysis of Dry Sow Housing in the United Kingdom

11.64 There is an obvious need for a comparative look in this country at the systems for keeping pigs and the effects of the differing environments. The following tables are from an article written by M.R. Muirhead, BVM and S, FRVCS, DPM on pig housing and environment published in the United Kingdom's The Veterinary Record in December 1983.[65]

11.65 Climatic differences aside these provide a useful commentary on pig welfare issues.

Table 2: Advantages and disadvantages of commonly used systems for keeping dry sows and their effect on the animal, the pig keeper, the environment and on production costs

	A Paddock systems	B Individual pens	C Yards
Housing	Grouped outdoors with varying degrees of shelter and no bedding	Indoors in confined pens or tethers Types of housing: Insulated with controlled ventilation Stalls on slats Stalls on solid floors Cubicles on slats Cubicles on solid floors with straw Tethered on slats Tethered on straw	Partial or totally indoors May have straw bedding No supplementary heat
Management	Working conditions poor Observation difficult and little can be provided No control over the individual Treatment difficult Pregnancy diagnosis impossible	Working conditions good Observation good High level required Individual attention easily given Treatment easy Pregnancy diagnosis easily carried out	Usually good conditions Observation fair Moderate level required Difficult to supervise the individual Treatment reasonable Pregnancy diagnosis difficult
Management requirements	Little required Little expertise required	Good management required Considerable expertise required	Moderate management required Moderate expertise required
Welfare considerations	Severe competition Severe fighting problem Parasite problems Lameness rare Pressure sores rare Abscesses common Some nutritional deprivation Exercise unlimited Comfort poor Disease control poor Vices moderate, eg. stone eating	No competition No fighting Parasites uncommon Lameness common Pressure sores common Abscesses uncommon Nutrition – good availability Exercise restricted Comfort variable Disease control good Vices moderate eg. bar biting	Environment competitive Severe fighting problems Parasite problems Lameness not uncommon Pressure sores not uncommon Abscesses may occur Some deprivation Exercise unlimited Comfort good Disease control good Vices moderate
Environment Temperature	Dependent on weather Often cold and wet Animals can huddle Unsheltered, lying area often wet	Generally regulated Warm and dry No ability to huddle Sheltered	Rarely drops below zero inside Dry areas available Huddling possible Sheltered
Air speed	Dependent on weather	Regulated and negligible	Usually low, but can be draughty
Hygiene	Food usually eaten off the floor subject to soiling and wastage High dung intake	Generally hygienic Little wastage No dung intake	Hygiene poor Eating straw encourages ingestion of faeces
Nutrition	Competition leads to bullying and variable feed intake levels Very difficult to feed in winter in muddy fields Extra nutrition is provided by the soil and grass eaten Increased feed levels are required the system results in thin sows	Feed intake readily supervised and controlled Total nutrition is supplied, formulated and regulated by man	Competition leads to variable feed intake requires provision of individual feeders Straw used for bedding will be ingested and have a nutritional value

Table 2: continued

	A Paddock systems	B Individual pens	C Yards
Water supply	Variable availability Difficult to check Subject to freezing Generally dirty	Normally good Shortage easily noted Usually clean	Normally good Difficult to check Subject to freezing outside Usually clean
Waste disposal	No problems but can be messy Well drained land required	Slurry conveniently handled Sows tethered on straw produce solid muck High risk of pollution if poor facilities	Solid manure Labour intensive to handle
Exercise	No restriction Exercise said to be beneficial to health	Restricted No evidence to show lack of exercise is detrimental	Limited May combine benefits of other two systems
Trauma	Frequent fighting Damage from fencing, machinery etc.	No fighting Lameness can occur if surfaces unsuitable Bed sores in thin sows, sores from bars or tethers	Fighting common Little mechanical damage Vulval biting prevalent
Infection Cross infection	Readily occurs, eg. worms, swine dysentery	Ready-controlled Extra vaccination may be required	Readily occurs in groups eg. worms, swine dysentery, salmonella
New infection	Easily become established Easily spread in herd Dirty water Dung intake Animals cold and wet in winter	Subject to considerable control Less easily spread Clean water No dung intake Animals warm and dry	Subject to considerable control Easily spread in group Dung intake from straw bedding Animals may lie in wet
Productivity	Feed utilisation lowered Fertility reduced	Good feed utilisation Good fertility	Reasonable feed conversion efficiency Fertility very good
Cost	Building costs inexpensive Land costs expensive Good fencing needed Land not available for other crops but soil fertility improved Poor inaccessible land can be used	Building costs substantial Land cost minimal Land does not compete with other crops and provides manure Manure handling more expensive	Building costs moderate – often converted old building Low land cost Land does not compete with other crops and provides rich manure
Other	Fire risk low No mechanical failure No smell	Fire risk high Subject to mechanical failure Electrocution risk Considerable smell	Fire risk moderate Possible mechanical failure Some smell

Source: M.R. Muirhead, 'Pig Housing and Environment', Veterinary Record, 1983, Vol. 113, UK pp. 587-593

Conclusion

11.66 All pig production systems have advantages and disadvantages from the welfare point of view. It is this Committee's view that an intensive system is proper if the health of the animals is not affected, if their behaviour is not disturbed, and if their adaptability is not overcharged.

11.67 The Committee inspected a number of different intensive systems from a several thousand sow corporate establishment to owner-operated farms with a few hundred sows and saw the various accommodation options described above in operation.

11.68 The Committee notes that while controversy has stimulated some welfare specific research in Australia on the impact of different intensive systems there has been virtually no study of the economic implications of the different approaches.

11.69 The Brambell Committee commented in its discussion on pig housing that the living space available in intensive systems have tended to decline to a level at or near that at which the saving in capital costs of the buildings becomes offset by loss of production.[66]

11.70 This is the difficult point in the debate on pig densities generally and on sow confinement in particular. The Committee **recommends** therefore that the Pig Research Council actively encourage research to address the cost equation associated with capital costs of pig housing and loss of production with a view to clarifying some welfare stress issues.

11.71 The Committee **recommends** that the maximum recommended stocking densities for growing and adult pigs in groups be reviewed to take account of the advances in understanding of physiology and behaviour and the welfare consequences of pen space, stocking rates and group sizes.

11.72 The Committee has considered the dry sow housing question and noting the advantages of stalls and tethers (protection from bullying, close monitoring and control of food intake), believes both to be undesirable means of restraint. The Committee is of the view that those systems providing sow cubicles with access to exercise areas are more conducive to sow welfare. The Committee **recommends** that future trends in housing the dry sow should be away from individually-confined stall systems and that this be reflected in the Codes of Practice for the welfare of the pig. The Committee **recommends** that tethering of sows be banned.

11.73 The Committee, noting that sow size has increased over the years, **recommends** that immediate attention be given to ensure that stalls and farrowing crates currently in use do not cause suffering due to cramping. The Committee **recommends** that the Codes of Practice for the pig be revised to ensure stalls and crates reflect the body dimensions of large sows.

11.74 On the issue of farrowing crates, noting that piglet mortality due to sow overlay is a major welfare consideration, the Committee **recommends** the encouragement of some producer pilot systems to test the viability of designs which will allow sows more freedom of movement and access to a separate exercise area at least some time each day.

11.75 The Committee **recommends** that governments and the industry encourage the adoption of alternative approaches to accommodating sows through their various stages and the improvement in husbandry skills needed to avoid welfare problems.

11.76 The use of prostaglandins to induce farrowing in pigs is a potential welfare issue. Obviously there are times when veterinary use is valid and in the best interests of the sow and her piglets. It is not clear how widespread the practice is but the Committee is aware that prostaglandins are administered to

ensure that sows give birth during working hours. The Committee questions the management practice of birth induction and **recommends** that the welfare implications of prostaglandin use be investigated.

11.77 More broadly the Committee **recommends** that the Commonwealth Government fund a research project in Australia to examine and evaluate housing systems that may be suitable to Australian conditions and that this review:

(a) examine overseas research findings into alternative housing systems;

(b) assess the welfare benefits and any welfare disadvantages of such systems;

(c) evaluate the economic viability of alternative systems; and

(d) take account of the views of producers, industry service providers, design engineers and specialist ethologists.

11.78 The Committee **recommends** that the Commonwealth Government provide tax incentives to encourage producers to upgrade their systems to incorporate improved design features to improve pig welfare.

11.79 Finally the Committee **recommends** that the appropriate authorities ensure that regular inspections of intensive pig production units be undertaken to monitor husbandry practices generally and to ensure that stocking densities do not exceed those specified in the Codes of Practice for the welfare of the pig.

ENDNOTES

1. Evidence, Australian Pig Industry Policy Council, p. S8793.

2. ibid.

3. ibid., p. S8804.

4. ibid., p. S8788.

5. Evidence, ANZFAS, p. S8826.

6. Model Code of Practice for the Welfare of Animals, 1. The Pig, Australian Bureau of Animal Health, 1983, p. 2.

7. Evidence, Australian and New Zealand Federation of Animal Societies, p. S8853-S8854.

8. ibid., p. S8854-8855.

9. ibid., p. S8855.

10. ibid., p. S8852.

11. ibid., p. S8822, p. S8855.

12. Evidence, Australian Pig Industry Policy Council, p. S8806.

13. I.J. Lean, 'Pigs', in Management and Welfare of Farm Animals, The UFAW Handbook, Third Edition, UK 1988, p. 147.

14. Evidence, Dr J. Blackshaw, University of Queensland, p. 6830.

15. Evidence, NSW Department of Agriculture and Fisheries, p. S8697.

16. Evidence, Australian Veterinary Association, p. S9026.

17. ibid.

18. ibid, p. S9031.

19. I.J. Lean, op. cit., p. 148.

20. Evidence, Australian Veterinary Association, p. S9031.

21. Evidence, Australian Veterinary Association, p. S9031.

22. NSW Department of Agriculture and Fisheries, AGFACTS, Agdex 441/720, 1982, p. 1.

23. ibid.

24. ibid., and Evidence, NSW Department of Agriculture and Fisheries, p. S8691-2.

25. Evidence, NSW Department of Agriculture and Fisheries, p. S8691.

26. ibid.

27. ibid.

28. ibid., p. S8692.

29. ibid.

30. ibid.

31. ibid.

32. ibid.

33. ibid.

34. ibid.

35. ibid.

36. ibid.

37. ibid., p. S8694.

38. ibid.

39. ibid.

40. ibid.

41. ibid.

42. ibid.

43. ibid.

44. Evidence, Australian Pig Industry Policy Council, p. S8804.

45. Evidence, NSW Department of Agriculture and Fisheries, p. S8695.

46. ibid.

47. ibid.

48. ibid., pp. S8695-S8696.

49. ibid., p. S9030.

50. ibid.

51. Evidence, Australian Veterinary Association, p. S9030.

52. Evidence, NSW Department of Agriculture and Fisheries, p. S8696.

53. ibid.

54. ibid.

55. Model Code of Practice ..The Pig, op. cit., p. 11.

56. Evidence, Australian Pig Industry Policy Council, pp. S8804-8805.

57. Evidence, Australian and New Zealand Federation of Animal Societies, p. S8856.

58. ibid., p. S8859.

59. ibid., p. S8864.

60. ibid., p. 8877 quoting from the United Kingdom's Farm Animal Welfare Council Report 1988, p. 6.

61. ibid., p. S8866.

62. ibid., p. S8876.

63. ibid.

64. ibid., p. S8875-8876.

66. M.R. Muirhead, 'Pig Housing and Environment', Veterinary Record, 1983, Vol. 113, UK, pp. 587-593.

66. F.R.W Brambell, op. cit., p. 13.