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## Does intensive pig farming have a viable future? – Concerns over housing and welfare

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### ABSTRACT

Pig housing has recently been under scrutiny, resulting in some recommendations for adult pigs that may involve less individual housing. Such recommendations have obvious implications for the future viability of the pig industry. Two questions that arise are, 1) are the recommendations scientifically valid and 2) what is the likelihood of developing alternative systems? In relation to the first question, a number of experiments have been conducted on the welfare of pigs in individual and group housing systems. The overall conclusion from this research is that it is the design of the housing system that is important for welfare and not the system *per se*. In relation to the second question, an alternative system has been developed in The Netherlands that involves indoor group housing for pregnant and lactating pigs. Part of the system is probably directly applicable to dry sow housing in Australia and New Zealand, while the farrowing and lactation components of the system require considerable development before it is applicable to commercial environments. While there is no doubt the industry will have to change and adopt either modifications of current housing designs or totally new housing systems, past experience would indicate pig producers are fairly innovative and are very prepared to adopt new ideas that have been shown to work. It is the scientist's role to make certain that recommendations are scientifically valid and that producers are provided with the options to choose from to make their farm viable.

**Keywords:** pig, welfare, stress, housing.

### INTRODUCTION

A recent Australian Government enquiry into intensive pig production has made a number of recommendations on housing including two that have direct implications for housing pregnant pigs (Anon. 1990). These are, 1) "That future trends in housing the dry sow be away from individually-confined stall systems", and 2) "That tethering of sows be banned". While the second recommendation has no great implication for the industry in Australia as few farms use tether-stall housing, the first recommendation, which implies that any type of individual-housing does not meet the welfare requirements of pigs, could involve the industry in great change. Another point the Senate Report highlighted was the role of science in the animal welfare debate. The Committee's criteria of economics, science, ethics, aesthetics and practicalities are difficult to reconcile with the scientist's approach which is to examine those measurable criteria that can arguably be interpreted as indicative of welfare, for example health, behaviour, physiology and production.

One must be extremely careful not to use the economic approach as an initial step in the process of attempting to improve welfare as it can immediately compromise the direction of research and prevents all options being considered. Also, science and the animal industries may find it extremely difficult to compete with aesthetics as what is aesthetic may be inappropriate for welfare, and again this approach may compromise both research direction and animal welfare.

The Senate Report lays some of the ground-work for where the industry may head in the future. Indeed, the recommendations are not dissimilar to others from overseas. For

example, in some European countries tether stalls are either banned or to be banned and the provision of bedding seems to be an increasing requirement in several countries (Anon., 1988; 1989; 1991; Jackson, 1989; Major, 1988).

The Australian report raises two questions that will be considered in this paper: Firstly, are the recommendations scientifically valid and secondly, what is the likelihood of developing alternative systems?

### ASSESSMENT OF WELFARE

There is a whole range of housing for pigs, particularly pregnant pigs, including tether-stalls, individual cage-stalls and group housing either indoors or outdoors. One problem is the need to decide on measurements that can validly compare the welfare of pigs in these different systems. There is a need to distinguish between a "happy" and an "unhappy" pig. Sometimes this distinction is fairly obvious, for example when looking at some striking physical characteristics such as a "thin-looking sick pig" and a "normal pig" and it is reasonable to assume that the "thin-looking" pig may be experiencing some problems that compromise its welfare. However, there is a need to be able to distinguish some more subtle characters that include such characteristics as the emotional state of the pig. There is some agreement that there are four criteria available - health, behaviour, physiology and production (Sybesma, 1981; Baxter *et al.*, 1983; Smidt, 1983; Zayan and Dantzer, 1985). However, it is generally insufficient simply to show a change in any of these criteria because, to interpret any change in terms of welfare it is necessary to know the consequences of the change. The research at our labora-

tory on housing for pregnant pigs has concentrated on stress physiology as changes associated with the stress response, particularly elevated corticosteroid concentrations, have been widely used as physiological indicators of welfare (Dantzer *et al.*, 1983; Dantzer and Mormède, 1983a; Moberg, 1985). Also, it is a reasonable belief that if stress increases then welfare decreases. Some of the consequences of increased cortisol concentrations in pigs are reduced growth rate and/or feed conversion efficiency (Hemsworth *et al.*, 1981) and the associated metabolic responses (Barnett *et al.*, 1982/83, 1985), immunosuppression (Barnett *et al.*, 1987a; 1992) and reduced reproductive performance (Barnett *et al.*, 1991a). Although this brief discussion has concentrated on the stress response mediated by corticosteroids, other hormones, including thyroid hormones, growth hormone, prolactin and endorphins, are responsive to stressors in a number of species (see Selye, 1976). Similarly, while the role of the sympathetic nervous system is well recognized in the acute phases of a stress response (Cannon, 1914; Moberg 1985; Oliverio, 1987) there is also evidence for the involvement of the parasympathetic nervous system in the stress response, particularly during the recovery phase (Bohus *et al.*, 1987). However, our understanding of the significance of some of these endocrine and neuroendocrine changes is generally poor.

### EXPERIMENTS ON HOUSING DESIGN

A number of experiments have been undertaken in the last 12 years and when all the studies are reviewed there is one overall take-home message and that is "it is the design of the housing system that is important for welfare NOT the system *per se*". Individual housing designs have been compared both for tether stalls and individual stalls and the major design change was the design of the stall divisions. The details of the physiological and behavioural differences between pigs in these different systems have been published (Barnett *et al.*, 1985; 1987b; 1989; 1991b). Suffice to say that in some designs there is good evidence of a chronic stress response of sufficient magnitude to cause adverse effects and that at least in some of the experiments there appears to be a behavioural basis to these physiological changes. That is, in some of these designs there is a behaviourally induced chronic stress response.

The experiments have shown that tether-stalls can result in reduced welfare if the stall divisions are of open vertical bars (Barnett *et al.*, 1985; 1987b; 1988; 1989). If the tether stall bars are covered in part with wire mesh, pigs in these stalls are physiologically similar to group housed pigs and there is no evidence of a chronic stress response (Barnett *et al.*, 1987b). In individual cage-stalls, stall divisions of horizontal bars result in a chronic stress response (Barnett *et al.*, 1991b); vertical bars or mesh over vertical bars result in responses in pigs that are similar to group housed pigs (Barnett *et al.*, 1989). Thus, as with the tether-stalls, the stall divisions can be modified to directly manipulate behaviour, physiology and welfare.

The baseline for comparison for all this work has been group housed pigs and it was an assumption that this was the most appropriate baseline to use. Some recent research, that

will be continued, has been on group housing and again this has shown that "it is the design of the housing system that is important for welfare NOT the system *per se*". For example, in a comparison of pen shape (small square or rectangular pens with a space allowance of 1.4 m<sup>2</sup>/pig, large pens with a space allowance of 3.4 m<sup>2</sup>/pig and pens with and without partial feeding stalls), partial feeding stalls and a rectangular shape appeared best in terms of reducing aggression around feeding and reducing the magnitude of the chronic stress response (Barnett *et al.*, 1992).

### ALTERNATIVE HOUSING SYSTEMS

There is considerable interest in what are euphemistically termed "alternative systems". Generally these mean group housing systems that often are outdoors (Corning, 1990; Shepherd, 1990; Thornton, 1991; Brouns and Edwards, 1992; Peet, 1992). Another alternative is a group housing system, based on large groups, indoors. One such system, the "multi-phase" system, has been developed by Dr. van Putten in The Netherlands (van Putten, 1990). It is developed around a group housing system for pregnant and lactating sows. The pigs are housed indoors in groups of 40 comprised of sub-groups of 10. The system relies on electronic feeding of concentrate with the additional group feeding of roughage to the groups; the latter appears to take considerable pressure off the feeding station and overcomes some of the recognised problems that can occur with electronic feeding stations (Cornes, 1986; Olsson *et al.*, 1986; Edwards and Riley, 1986; Edwards *et al.*, 1986; van Putten, 1990; Sherwin, 1990). This part of the system is probably directly applicable to Australian and New Zealand conditions. The sows also farrow in sub-groups and the important features are individual nests and straw and the nests are removed after 1 week and then the sows and piglets are communal. This part of the system would probably require considerable development before it is applicable to commercial Australian and New Zealand environments.

While this alternative system appears promising there are a number of questions that are yet to be answered. Firstly, what is the optimum sub-group size and what are the implications of using larger than optimum sub-group size? This information is important in making the system more readily adaptable to larger farms. Secondly, what are the consequences of concurrent versus sequential feeding? This information will be useful for implementing the dry sow housing component as it will determine the importance of the communal roughage-feeding aspect of the system; it is also relevant to other systems that use electronic feeding stations. Thirdly, can conventional farrowing systems for farrowing and lactation be used to overcome the need to use the less well-developed farrowing/lactation part of the system? This information would determine for how long pigs can be separated without high levels of aggression at re-grouping. If it is 4 weeks, sows could be housed in sub-groups within a larger group while pregnant, farrowed in farrowing crates and at weaning be re-grouped into their sub-group. This, or a variation of it, may be a viable option for the future.

## CONCLUSIONS

In conclusion, as far as welfare is concerned, the pig industry does have a viable future. There is no doubt it will have to change and adopt either modifications of current housing designs or totally new housing systems. However, past experience would indicate pig producers are fairly innovative and are very prepared to adopt new ideas that have been shown to work. The scientists' role is to make certain that recommendations are based on good science and that producers are provided with the options to choose from to make their farm viable.

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