OUTDOOR MANAGEMENT OF PIGS: POTENTIAL, PERSPECTIVES AND PROSPECTS

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SUMMARY

This paper assesses the reasons for the notable increase in outdoor pig production in the **UK,** as well as the problems and potential that exists within the system that have yet to be resolved or exploited. In particular the possibility of using bulky, low cost feeds, such as fodder beet, maize silage and grazing are considered. The paper concludes that, although the system has largely been developed in a temperate environment, the principles, upon which it is based, might have considerable potential for application in other regions and so enable more appropriate and resource efficient systems to be developed.

INTRODUCTION

There has been a dramatic resurgence in outdoor pig production in the United Kingdom in the last few years. This has occurred for several reasons including:

1. Relative profitability of outdoor pigs compared with cereal production.
2. Animal welfare considerations and/or perceptions.
3. High capital demands of intensive pig production.
4. A succession of mild winters in the UK.

and 5. A demand by consumers for "Wholesome Meat". (Riley 1989)

As 'a result of this interest the UK outdoor pig industry, which now involves around 10 percent of the national herd, could eventually double or treble in size. Although called "Outdoor Pigs", generally only breeding animals are kept outdoors, and weaner pigs (usually 3-4 weeks old) are brought indoors to grow and finish. The sows are generally kept in uninsulated metal or plywood " arcs "at a stocking rate of between 8 to 10 per acre; they are group housed during gestation and individually housed during pregnancy. Straw bedding is provided in the arcs and most feeding takes place on the ground. This presentation will only consider the aspects relating to outdoor pig breeding and maintenance of the baby pig until weaned. In particular the paper will consider the specific differences that exist between the "indoor" and "outdoor" systems, highlighting areas of advantage or disadvantage in the outdoor system that could influence any decision on its application.

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PERFORMANCE, COSTS AND RETURNS

Capital requirements

The reduced capital investment required to set up an outdoor unit compared to an indoor system is one of the main attractions for setting up this type of system. Table 1 shows the difference in capital requirements per sow between the two systems.

Table 1 Capital requirements per sow (pounds sterling)

	Indoor	Outdoor
Value of sow	122	118
Share of boar value	14	12
Buildings and equipment	415	216
Working capital	111	111
Total capital (excluding land)	662	457

Source: (Ridgeon 1988)

The values shown here exclude the cost of land for the outdoor system and consider that the indoor system be established on an existing site with basic infrastructure. If land has to be purchased or a new site is established then extra costs will be incurred. Excluding these points it is clear that considerable potential for cost saving in the establishment of sow accommodation exists using an outdoor system.

Performance

The performance of pigs outdoors depends on a range of factors including geographical and topographical location, soil type, rainfall, breed of pig, nutrition, the availability of shade, wallows and/or showers, etc. Ideally they appear to perform best in:

1. cooler rather than hot locations
2. on well drained soils
3. in low rainfall areas
4. using breeds that have pigmented skins and an above average level of backfat
5. where shade and wallows are provided
6. where sow diets are restrict fed during gestation and " ad libitum " fed during lactation

Table 2 gives a comparison between the performance of indoor and outdoor herds recorded in 1988 in the University of Cambridge, Pig Management Scheme.

These results clearly indicate that little difference exists in the performance of the two systems apart from the greater food consumption of outdoor sows. The extra feed is largely required to generate body heat in the cooler environment. At present in the majority of units the sows nutrition is provided as concentrate feed.

Table 2 Comparison between outdoor and indoor herds

	Outdoor	Indoor
Litters per sow per year	2.21	2.36
Live pigs born per litter	11.2	10.6
Weaners per litter	9.6	9.3
Weaners per sow per year	21.1	21.9
Sow feed (tonnes per sow per year)	1.44	1.23

Source:(Ridgeon 1988)

Costs and returns

Analysis of the variable and fixed costs, together with returns for pig herds recorded in the Cambridge University scheme are given in tables 3 and 4.

Table 3 Variable costs for outdoor and indoor herds per weaner (pounds sterling)

	Outdoor	Indoor
Feed	16.40	16.05
Labour	5.04	4.92
Farm transport	0.66	0.39
Veterinary	0.40	0.69
Artificial insemination	0.06	0.08
Power and water	0.19	1.00
Miscellaneous	0.42	0.60
Litter	0.13	0.25
	23.30	23.96

Source: (Ridgeon 1988)

Table 4 Fixed costs and returns for outdoor and indoor herds per weaner in 1988 (pounds sterling)

	Outdoor	Indoor
Maintenance	0.34	0.57
Equipment	0.29	0.24
Building charge	0.75	1.62
Pasture charge	0.66	--
Variable costs	23.30	23.96
Stock depreciation	0.90	1.26
Total costs (excluding interest)	26.24	27.65
Weaner price (net)	27.50	26.74
Margin (excluding interest)	1.26	-0.91

Source: (Ridgeon 1988)

The data shown in Tables 3 and 4 indicate that whilst outdoor producers paid more for food, they saved on both fixed and variable costs. These data were collated in 1988 and demonstrate that even during a year of poor pig prices, when the indoor pig industry lost money, the outdoor production of weaners remained profitable.

The outdoor pig industry has not changed certain of its methods of operation, and in particular those relating to feeding and reducing environmental stress for some time. At the same time the indoor pig industry has made considerable progress in reducing feed costs through the use of alternative feeds and reducing environmental stress. In particular outdoor pigs suffer more severely from the effects of "Summer Infertility" and "Autumn Abortion", which is believed to be environment related, than indoor pigs. Clearly the development of lower cost outdoor feeding systems, improving environmental aspects, including fertility and abortion problems, could make outdoor pig production even more attractive than it already is.

This paper will therefore consider possible nutritional means by which these aspects might be improved.

NUTRITION

Apart from the need to present outdoor pig feeds in pelleted, roll, biscuit or cob form and use ingredients with good binding capabilities and waterproofing properties little work has been carried out to determine the specific needs and requirements of outdoor pigs (Poornam 1989). Currently the assumption is that they have the same requirements as indoor pigs. Very little note is also given to the fact that since they are outside they are in a better position to utilize non conventional bulky feeds such as root crops and even grazing. Although farmers worldwide have been feeding fibrous feeds to pigs for many years, it has only recently been shown that the mature pig is able to digest fibre and particularly cellulose using similar organisms to ruminants. In fact the digestibility of cellulose in unlignified feeds may approach 100 percent, and up to 30 percent of energy intake may be derived from volatile fatty acids. The factors that affect the pigs ability to utilize fibrous feeds include:

1. Age
2. Previous experience of fibrous feeds
3. Particle size of feeds
4. Presence of anti nutritive factors
5. Balance of nutrients in feed
6. Concentration of nutrients in feed
7. Presence of antibiotics
8. Degree of lignification of fibre
9. Presence of other non-cellulose crude fibre components in feed
10. Genetic characteristics of animal (Machin 1989)

Considering the many factors that affect the use of fibrous feeds in the pigs diet, it is clear that the gestating sow in particular, with its relatively low nutrient requirements and large potential food intake, is an ideal candidate to be fed on such feeds. It would appear unlikely that other ages of pigs could economically be fed such feeds without a considerable change in current circumstances.

Alternative feeds

Before considering the performance of pigs fed alternative feeds it is interesting to consider the range of feeds that could be used and compare them in terms of yields of nutrient per hectare and the cost of producing each unit of nutrient. Such an analysis is given in table 5 and shows the yield potential and variable costs per megajoule of digestible energy of a range of bulky feeds compared with conventional cereal grains.

Table 5 Typical yields and variable costs of some alternative feeds in the UK*

Feed	Yields (tonnes/ha)	DM yield (tonnes/ha)	Yield of DE (000MJ/ha)**	Variable costs pence/MJ/DE)
Potatoes	37.5	7.9	85	1.63
Fodder beet	75	13.5	153	0.18
Swede turnip	69	6.6	78	0.18
Grass silage	55	11.1	121	0.10
Cabbage	90	7.7	78	0.35
Maize silage	50	12.6	110	0.16
Winter barley	5.65	4.9	68	0.29
Winter wheat	6.75	5.8	91	0.25

Source: (Machin 1989)
** Corrected for fermentation in large intestine
* Values do not include harvesting or storage

It is quite clear from the above data that very much more digestible energy at a lower unit cost can be produced per hectare using non traditional crops than cereal grains. In order that this advantage can be exploited it will be necessary to develop appropriate handling - feeding systems. The ideal system would involve the pigs consuming the mature crops directly in the field and so avoiding the need to harvest and process the crop.

Some limited practical studies, using small numbers of pigs have been carried out in the UK using grazed pasture, fodder beet and maize silage. In these studies supplementary feed was provided using an electronic sow feeder. Brief details of these studies are provided below.

Rotational grazing

In this trial, carried out by Chambers (1987), two groups of sows (approx 40 per group) were given free access to grazing on a rotational basis and supplemented with 1 kg or 2 kg of balancer feed per day using an electronic sow feeder throughout gestation. The aim was to obtain a weight gain of 10 to 15 kg over the breeding cycle. The results are shown in Table 6.

Table 6 Performance of sows on a rotational grazing system, with a balancer provided by an electronic sow feeder

	Group 1	Group2
Initial sow weight (kg)	>200	<200
Intake of balancer (kg/day)	1	2
Mean weight gain of sow (kg)	14.5	24.7
Mean number born alive	10.5	9.9
Mean number born dead	0.7	0.9
Post weaning days to service	13.6	12.7

Source: Chambers (1987)

In this particular trial, despite an apparent scarcity of grass levels of performance were quite acceptable and in fact the only problem noted was that the group fed the higher level of supplement became slightly overweight. Although this work was not replicated it does indicate that grass has a potential as a gestating sow feed.

Fodder beet

In this study, again carried out by Chambers (1987), the strip grazing of fodder beet by groups of gestating sows receiving a supplementary balancer feed at three levels (1.0, 1.5 and 2.0 kg per day) was evaluated. The strip grazing was adjusted to provide each sow with approximately 17 kg of fresh fodder beet per day and the aim was to obtain a net weight gain over the breeding cycle of between 10 kg and 15 kg. The results are shown in table 7.

Table 7. Performance of sows strip grazed fodder beet with balancer provided using an electronic sow feeder

	Group		
	1	2	3
Intake of balancer (kg/day)	2	1.5	1
Initial sow weight (kg)	187	221	241
Number of sows per group	46	22	21
Mean weight gain of sow (kg)	31	20	16
Mean number born alive	11.0	11.8	9.4
Mean number born dead	0.8	1.2	1.6
Percentage failing to farrow	0.5	0.18	Nil

Source: Chambers (1987)

The results above show that the weight gain of all sows exceeded the level anticipated. Since the numbers of sows are small, from a statistical point of view, it is difficult to draw profound conclusions from reproductive data. However, sows fedonly 1 kg of balancer did appear to be have a slightly smaller number of piglets born alive than other groups. The overallimpression is that this could be a potentially effective way of feeding outdoor pigs.

Maize silage

A similar feeding trial, carried out by Carlisle and Mitchell (1984), involved the feeding of maize silage (whole plant harvested at dent stage) to a small group of gestating sows , whose performance was compared with a similar group fed compounded feed. Those fed the silage received lkg per day of a compounded balancer feed, using an electronic sow feeder, together with approximately 11.8 kg of maize silage until 3 to 4 weeks before farrowing. The results are shown in Table 8.

Table 8 Performance of sows fed on maize silage, with a balancer provided using an electronic sow feeder

	Group 1	Group 2
Initial sow weight (kg)	171	184
Number of sows per group	9	16
Balancer meal (kg/day)	1	Nil
Sow cobs (kg/day)	Nil	2.7
Maize silage (kg/day)	11.8	Nil
Mean sow weight gain (kg)	32	34
Mean number born alive	12	11.4
Mean number born dead	Nil	0.15

Source;Carlisle and Mitchell (1984)

Although this trial was only a "look see" study it does indicate the potential value of maize silage in the feeding of gestating sows.

CONCLUSIONS

The information presented here refers largely to the UK situation, but the principles demonstrated have world wide potential for application. Clearly the main advantages of an outdoor system compared to existing indoor systems are:

1. the lower capital costs of establishment,
2. ease of disposal of animal waste,
3. considerable potential for reducing costs through the use of low cost bulky feeds,

and 4. perceived welfare benefits.

There are, however, certain disadvantages with the system) which need to be resolved including:

1. the increased incidence of "summer infertility" and "autumn abortion" in sows kept outdoors,
and 2. the greater demands on labour working outside.

Considerable research is being carried out to try to resolve the fertility and abortion problems. This subject is beyond the scope of this paper, but appears to involve a complex interaction between many factors including, breeding, environment, nutrition, etc. Since not all sows or units experience the problem to the same degree it would appear that means of resolving the problem must be possible.

It is clear that, although outdoor pig production has some problems unresolved and potential undeveloped, it can be extremely profitable. There would therefore appear to be considerable grounds for considering the principals behind this system for greater application in other areas of the world in order to take advantage of what is a simple-low cost system, more efficiently use resources and, from the farmers point of view,increase profits.

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