

An industry guide to the production of heavier pigs



Summary checklist

- A 10% increase in carcass weight could reduce cost of production by 3–4p/kg deadweight.
- Production options with heavier pigs:
 - Maintain output with fewer sows.
 - Increase output from same sow numbers with additional finishing accommodation.
- Good planning and management are critical in finishing pigs to heavier weights and producers should consider the following:
 - Secure market outlets and contracts for heavier pigs.
 - Predict the effect of increasing carcass weight on financial performance using growth and cost modelling. Compare predicted against actual results.
 - Allow additional working capital and consider any additional requirements for housing, feeding and waste production.
 - Monitor growth and feed conversion for cost of production.
 - Monitor grading results to avoid contract penalties.
 - Control variability in slaughter weight and grading to meet contract specifications.
 - Minimise skatole levels through good hygiene and ventilation, high growth rate and dietary control.
 - Reduce increased risk of fighting in boars finished to heavier weights.
- High growth rates are essential to capture the full cost benefits - they reduce production costs and improve meat quality by increasing tenderness and potentially reducing boar taint.
- Heavier carcasses offer opportunities for new product development to meet the needs of modern consumers. High standards in pig meat quality can be maintained with the production of heavier pigs.
- Boar taint remains a concern as Britain is one of few countries which produce entire boars for meat production.
- A proportion of boars (4–11%) have skatole (taint compound) levels above the threshold level of 0.25 ppm, but this proportion does not appear to increase with increasing carcass weight. Nevertheless it is essential that producers take steps to minimise boar taint to avoid negative consumer reaction to British pig meat.
- Boar carcasses exceeding 85kg must be taint tested under EU legislation.
- Surgical castration is the most effective method of boar taint control, but producers need to consider welfare, cost, carcass quality, legislation and quality assurance implications.

Introduction

There is interest in the British pig industry, especially from producers, to increase carcase weights to reduce production costs. This booklet identifies some key issues surrounding such a move.

Comparison of carcase weights in Europe

The average carcase weight of British pigs is relatively low compared with other major European pig producing countries (see Table 1 below). An increase offers the potential to reduce cost of production. A British Pig Executive report¹ estimated that a 10% increase in carcase weight had the potential to cut production costs by as much as 4 pence per kg.

Table 1 Average pig carcase weights in selected countries

	Average carcase weight (kg deadweight)
Italy	115
Germany	93
Netherlands	92
France	88
Sweden	87
Spain	83
Denmark	78
Irish Republic	73
United Kingdom	73



Market outlets for heavy pigs

It is important that appropriate market outlets are identified before adapting production systems for heavy pig production. Heavy carcasses are not appropriate for all pig meat products and therefore not all processors will accept or offer contracts for them.

As the concept is largely new to the modern British market for pork and pork products, there is a degree of 'experimentation', product development and consumer testing taking place. Processors interested in heavier carcasses may wish to evaluate a limited number of carcasses before offering producers a contract. This provides an opportunity for both the producer and the processor to ensure that the genetics and production methods are suited to meet the required contract weight and P2 probe specifications for heavy pigs.

While contracts for heavy pigs with a carcase weight exceeding 85kg may be available, the contract may still require the carcase to be under a 13mm probe. Carcasses with backfat levels higher than this limit may incur large price penalties.



Cost of production: slaughter weight, boars, gilts and castrates

There are many factors that have an impact on the cost of production other than slaughter weight, for example differences in the growth rate and carcase composition of boars, gilts and castrates.

Using growth models and economic inputs, it is possible to estimate changes in cost of production according to pig performance, carcase composition, slaughter weight, feed restriction and feed costs for boars, gilts and castrates. This was the objective of an MLC-commissioned independent desk study. Detailed results are presented in the Appendix and the key findings were as follows:

- When the results for boars, gilts and castrates were pooled, on average the cost of production for both deadweight and lean decreased by about 3p/kg for every 10kg increase in slaughter weight from 100kg to 130kg.

As legislation limits the production of boars to a maximum of 85kg deadweight, in the absence of taint testing, various comparisons of the costs of production for boars and castrates were made at slaughter weights of 108kg and 130kg respectively (see Table 2 for summary). An average slaughter weight of 108kg for boars would result in an average herd carcase weight of 80kg, allowing a safety margin for the permitted maximum of 85kg.

Table 2 Differences in the cost of production of boars and castrates at increased slaughter weights[†]

	Differences in cost of production between boars and castrates	
	p per kg deadweight	p per kg of lean
<i>Ad libitum</i> fed to slaughter	3.3 ●	11.2 ▲
20% feed restriction of castrates from 100kg to slaughter	2.9 ●	5.7 ▲
20% reduction in feed costs	4.7 ●	7.4 ▲

[†] Model calculations based on castrates slaughtered at 130kg (100kg deadweight) and boars at 108kg (80kg deadweight)

● Castrates have lower cost of production than boars

▲ Castrates have higher cost of production than boars

Castrates slaughtered at 130kg (100kg deadweight) showed an advantage of about 3p/kg deadweight in cost of production over boars slaughtered at 108kg (80kg deadweight). However, on a lean basis this was reversed in favour of boars with the cost of production being about 11p/kg lower than that for castrates. This large difference in lean production costs can be mainly attributed to fatness with a predicted P2 of 18mm for castrates at 130kg compared with 11mm for boars slaughtered at 108kg.

Improvements in carcase grading and cost of lean meat production could be made by restricting feed intake in castrates towards the end of the finishing stage. This was modelled by restricting feed intake by 20% from 100kg to slaughter at 130kg.

□ A 20% restriction in feed intake reduced the cost advantage of boars over castrates for lean production from about 11p to 6p/kg. There was no impact on the cost of deadweight production.

Future significant reductions in feed costs may offset the poorer efficiency with which castrates convert feed to gain at heavier weights, possibly resulting in castrates with lower cost of production (carcase and lean yields) than boars. This was examined by lowering feed costs by 20% across boars and castrates.

□ A 20% reduction in feed costs improved the cost advantage of castrates over boars in deadweight production from about 3 to 5p/kg, BUT a difference of about 7p/kg in lean production was maintained in favour of boars.

- ❑ In considering the above, including legislative requirements, the proposed optimum strategy for production was to slaughter boars at 108kg and to take gilts to a heavier weight, possibly to 130kg.

It is important to note that the review did not attempt to estimate the costs associated with changes in industry practice, which may be required for the production of heavy castrates and gilts. These include farm-based costs such as building maintenance, investment in feeding systems and slurry storage and post-farm gate costs such as slaughterhouse modifications to handle and process heavier carcasses and trimming costs.

- ❑ Growth models coupled with input costs are very useful tools in predicting the effects of a given increase in carcase weight on the financial performance of each enterprise. In planning for heavier pig production, producers should consider consulting pig technical professionals with commercial expertise in growth and economic modelling.



Additional working capital

Taking pigs to heavier slaughter weights will require either more finishing accommodation or the number of pigs finished will need to be reduced. In both these scenarios the fixed cost structure will alter per pig. These additional costs have not been taken into account in the comparisons presented in Table 2 or in the Appendix. Overhead costs can be reduced through faster rates of growth and throughput, thereby increasing deadweight output per unit of fixed costs.

It is also necessary to consider the cash flow implications associated with the additional investment tied into the extended days to slaughter. An estimation of the typical additional costs per pig that are incurred when carcase weight is increased from 72 to 85kg are given in Table 3.

Therefore consideration needs to be given to the additional working capital required per pig (assuming no change in the total numbers finished) to cover these additional production days prior to receiving any income. Repair and maintenance costs for buildings and equipment are also likely to increase when slaughter weights are increased due to higher levels of wear and tear.

Table 3 Estimated additional working capital costs (£ per pig) associated with extra days to slaughter as carcass weight is increased from 73kg to 80kg for boars and 90kg for gilts

	Boars	Gilts
Current average slaughter weight		98kg
Current carcass weight		73kg
Heavier target slaughter weight (kg)	108	118
Heavier target carcass weight (kg)	80	90
Additional days to slaughter	10	26
Feed intake (kg/day)†	2.80	2.87
Feed cost (£ per tonne)	£106.44	£103.95
	£ per pig	£ per pig
Feed	2.98	7.76
Vet & med	0.17	0.40
Water	0.07	0.20
Bedding	0.12	0.33
Power & heat	0.07	0.17
Additional interest @ 6.5%	0.01	0.03
Total	3.42	8.89

† Estimate based on MLC Research²

Management factors in the production of heavier pigs

Successful pig production requires exacting standards of herd management and husbandry skills, which applies to all systems including finishing to heavier weights.

It is important to ensure that housing is suitable for finishing pigs to heavier weights. Under EU Pig Welfare legislation, floor space allowance must be increased with increasing weight and to comply, producers finishing over 110kg must provide extra space or reduce stocking density (see Table 4).

Table 4 Unobstructed floor area available to each pig in a group

Average weight of pig in pen (kg)	m ² per pig
Over 30 up to 50	0.40
Over 50 up to 85	0.55
Over 85 up to 110	0.65
More than 110	1.00

Careful monitoring of weight gain in the final weeks before slaughter is required to ensure that pigs remain within contract specifications for carcass weight and backfat thickness. Any delays in dispatch date for slaughter can have a serious impact on grading results. Therefore efficient planning and management of kill dates and haulage are a prerequisite of all finishing systems including production to heavier weights.

Monitoring of feed intake and feed conversion are also critical in establishing the cost benefits of finishing to heavier weights. Deterioration in feed conversion at this late stage when feed intakes are high can significantly increase the overall cost of production and impact on profitability.



Variability in the growth and grading of individual pigs tends to increase with increasing weight and therefore loss of consistency in end product quality is a potential risk with increased carcass weights. Not all finishing systems are well suited to heavier pig production. All-in all-out systems allow pigs of a similar weight and grade to be selected over a period of two or three weeks providing greater control over variability.

With increasing weight and age, there may be increased signs of aggressive and sexual activity, particularly between boars. This could include fighting, riding and other injurious activity. Fighting can result in increased mortality, carcass damage and reduced meat quality. Aggressive behaviour and fighting amongst boars can be controlled by maintaining pigs in stable social groups and minimising the time that unfamiliar animals are mixed in transport and lairage. Where such problems prove difficult to manage, the case against surgical castration on welfare grounds needs to be balanced with welfare and other issues concerning the production of boars to heavier weights.



- Environmental impact

Effluent and manure production will increase with increasing slaughter weight as the amount of feed required per kg of gain must carry a higher maintenance cost. The poorer efficiency with which castrates convert feed to gain represents an additional loading of waste to the system and the environment. Waste management and requirements to limit environmental impact should therefore be considered in the planning of finishing to heavier weights.

Commercial nutritionists with expertise in growth modelling are well placed to predict the quantity and composition of waste resulting from increased slaughter weights for a given level of performance, carcase composition and nutrient input. Diet composition and feeding strategy can also be tailored to genetic potential and production system to minimise waste production and nutrient excretion from heavier pigs.

- Haulage

The haulier must be informed of any increase in the average weight of pig within each batch selected for transport to slaughter. For a typical articulated lorry carrying 210 slaughter pigs, an increase in weight per pig from 95 to 105 kg will increase the total weight for that batch of pigs by 2,100 kg. If this is not taken into account it could exceed the maximum gross weight for that vehicle and may lead to prosecution of the driver and removal of the operator's licence.

Another consideration is the legal stocking limit for the transport of pigs. Current guidelines state that stocking densities during transport must allow all pigs to lie down and stand up in their natural position. In order to comply with these minimum requirements, the loading density for pigs of around 100 kg should not exceed 235 kg/m².

Whilst the total number of pigs carried may be reduced and the transport cost per head increased, the cost per kg deadweight may not differ greatly as each pig will carry a higher carcase loading.

- Carcase quality

Modern genotypes, intensively selected for reduced fatness and high rates of lean deposition, are well placed for the production of heavier carcasses with acceptable levels of backfat thickness. On average P2 will increase by about 1mm for every 10kg increase in carcase weight. Model estimates predict backfat levels of 11 and 13.6mm at average slaughter weights of 108 and 120kg for boars and gilts respectively. However, the relationship between P2 and carcase weight is highly variable and it will differ from farm to farm depending on genotype, health status, housing, feeding and other factors. It is therefore important that each enterprise reviews this independently to establish the scope for increasing carcase weight without incurring serious grading penalties.

There can be significant seasonal effects on grading within farms and a close watch needs to be

maintained on any changes so that appropriate action can be taken to limit contract penalties.

In the case of castrates, fat levels are likely to be excessive and unacceptable to processors and consumers with a predicted P2 of about 18mm at 130kg slaughter weight.

Fat deposition in castrates can be reduced by limiting energy intake, either by dietary dilution (particularly using sugar beet pulp) or feed restriction or a combination of the two. However, growth rates on such diets would be reduced and the cost per kilo gain greatly increased. These problems would be exacerbated under a combination of restrict feeding and dietary dilution. Restricting growth through feed intake has also been found to result in tougher meat. MLC research³ has shown this effect to be about 0.4 scale points on a 1-8 scale as assessed by a trained sensory panel. This equates to approximately a 7% reduction in tenderness. Juiciness is also reduced.

The increased fatness of carcasses from castrates can have a very serious detrimental effect on consumer perception of pig meat unless the level of butchery trimming is increased commensurately. Larger joints comprised of several muscle blocks, for example leg joints of pork or gammon for foodservice use, present a problem in that the larger fat deposits between the muscles are difficult and expensive to remove.

It is likely that carcass quality differences between entire and castrates at a given carcass weight will diminish with breed improvement, but few data are available to confirm this. The converse is that crosses of less improved breeds, such as those used to differing extents in outdoor pigs, are likely to have larger carcass quality differences between entire and castrates.



Carcase cutting and product development

The carcass of a heavier pig creates opportunities for the development of new cutting techniques to produce a wide range of products, meeting the diverse needs of modern consumers.

- Larger muscles make it easier to use seam butchery techniques. Traditionally pork is prepared into smaller pieces by cutting around the bone structure of the carcass. Seam butchery methods involve cutting along and between muscles, which facilitates the easy removal of fat deposits and gristle. The result is lean, well-trimmed, attractive cuts and joints.



- Increased muscle size provides the opportunity for boneless whole muscle roasts (loin, topside and silverside) or sliced single muscle steaks. Larger muscles have a larger surface area and mean that portion-controlled steaks can be cut thinner for quicker cooking.



- A wider range of cuts and products such as steaks, mini joints, pork osso bucco, escalopes, rustic belly cuts etc can be produced giving the consumer a wider choice.



- Larger muscles mean that a high proportion of the forequarter can be used for steaks, cubes and stir-fry which are lean, easy to cook and less wasteful for the consumer.

MLC has produced a guide⁴, which illustrates the wide range of cuts and joints that can be produced from a range of different weight pork carcasses and provides a number of options for adding value with the use of marinades and spices.

Meat Quality

It is essential that any move towards the production of carcasses weighing significantly more than the current national average of 73kg does not result in a loss of meat quality, either visual appearance at retail or eating quality in terms of tenderness, juiciness and flavour.

- **Visual appearance**

The carcasses of entire male pigs can exhibit significantly higher levels of rind-side damage because of fighting. The economic significance of this damage has reduced as the proportion of pig meat sold rind-on has decreased.

Another attribute of meat quality is muscle condition. There is little evidence of any difference in pale soft exudative (PSE) or dark firm and dry (DFD) conditions in meat from entire males versus castrates. The main exception is where entire males have been fighting for prolonged periods close

to the time of slaughter. The risk of aggressive behaviour and fighting amongst entire males may increase with increased slaughter weights and the onset of sexual maturity. Pigs exhausted by fighting are at much higher risk of DFD (Dark Firm and Dry) muscle. This meat has poor visual appeal and keeping quality. It is, however, relatively tender.

- Eating quality

The potential problem of increased boar taint in heavier pigs and some methods of control have been considered earlier in this booklet. Other key attributes of eating quality include tenderness and flavour.

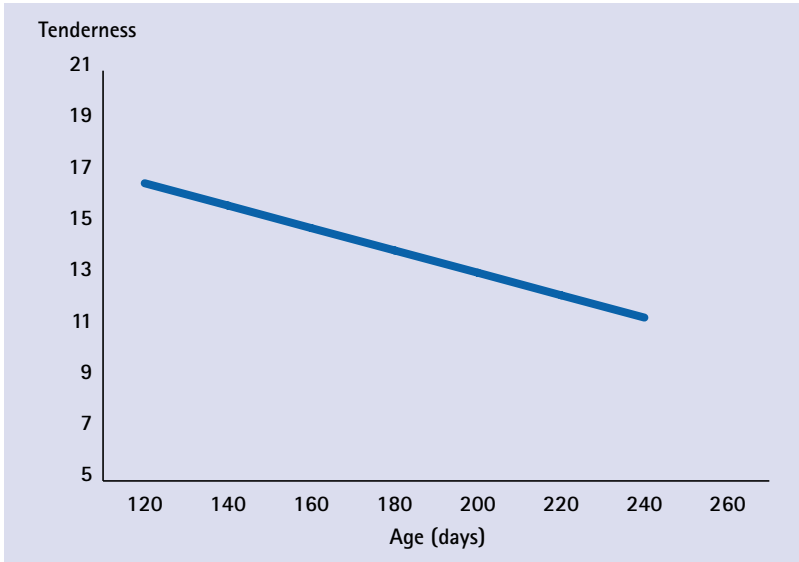
It is difficult to separate the effects of weight on tenderness from those of age, growth rate and fatness. MLC research² has shown that heavier pigs (108 kg slaughter weight) had lower tenderness scores than lighter pigs (88 kg slaughter weight). However, further analysis demonstrated that age was the important effect when the data were regressed to a constant weight (*see figure 1*). This suggests that heavier animals are tougher only because they are older.

It is likely that the effect of age on tenderness is related to growth rate, with animals that have been able to achieve the same weight at a younger age having faster growth. In order to reduce the risk of impairing tenderness in heavier animals it is therefore important to ensure that growth rates are maximised as far as possible and animals are slaughtered at as young an age as possible.

Older animals at slaughter are also likely to be fatter. According to conventional wisdom this might be expected to deliver improved eating quality because of higher marbling or intramuscular fat. The published scientific literature, however, does not provide strong evidence for a large effect of fatness on eating quality. Increased carcase fatness is more of an issue in terms of visual appeal and trimming loss than eating quality.



Figure 1 Relationship between tenderness and age at slaughter (White and Meishan crosses) when data are regressed to a constant weight



Source: MLC 1998

- Flavour

It is difficult to separate clearly some elements of eating quality, such as flavour and odour, as there can be overlap in sensory perception of these attributes. Additionally the presence of boar taints, such as skatole and androstenone, may form a part of the flavour and odour response unless sensory panellists are trained to identify these separately.

There is little published research on the effects of increasing carcass weight significantly above the current national average on the flavour of pork and pork products. MLC research² found no changes in pork flavour and odour scores of cooked loin and fat samples as carcass weight was increased from 65 to 80kg (88 and 108kg slaughter weight).



Heavier carcasses and boars

A push towards the production of heavier carcasses raises concern over boar taint in pork and pig meat products and the potential damage to consumer sales. This is because Britain is amongst a minority of countries which do not castrate boars for meat production, and there is concern that older and heavier boars used for meat production may develop higher levels of taint.

The major reason for leaving boars entire is that they are more efficient in converting feed to meat than castrated males, as they are leaner and faster growing. Leaving boars entire also promotes a good welfare image of British pig production as surgical castration may be considered to cause unnecessary suffering and pain. Whilst there are a number of disadvantages and advantages associated with meat production from boars versus castrates, (*summarised in Table 5*) welfare concerns and producer reluctance to castrate are likely to tip the balance in favour of keeping boars as entires. Producers and processors should also be aware of legislation and quality assurance scheme requirements covering surgical castration (*see page 19*).



Table 5 Some advantages and disadvantages associated with the production of castrates

Advantages	Disadvantages
<ul style="list-style-type: none">• Reduce taint problems• Reduced aggression and fighting• No requirement for boar taint testing of heavier animals for fresh pork• At heavy carcass weights the poorer efficiency of castrates may be partly offset by cheaper diets but entires would still be more efficient	<ul style="list-style-type: none">• Reduced welfare• Loss of high welfare image• Stockworker resistance• Training and labour cost of castration• Increased mortality• Slower growth rate• Fatter carcasses• Higher feed costs per kg lean production• Higher waste output and pollution per kg lean produced

- **Boar taint**

Boar taint arises predominantly from two compounds, androstenone and skatole, found in pork and meat products from entire males.

Androstenone is a natural sex pheromone found in boars. Some consumers can detect the presence of androstenone in pig meat at high concentrations (eg above 1 ppm), as a sweat-like odour.

Skatole is of dietary origin and is a by-product from the microbial fermentation of tryptophan (an essential amino acid) in the pig's gut. Skatole can be found in meat from boars, gilts and castrates, but levels are usually highest in boars. Most producers can detect the presence of skatole in pig meat at high concentrations (eg above 0.25 ppm), as a mothball-like odour.

In a large-scale European study involving the MLC, it was found that British consumers were relatively insensitive to boar taint. Of the two compounds, skatole was found to be the more important.

Despite the general concern over taint in meat from boars slaughtered at heavier weights, there is little published research on the relationship between carcass weight and the chemical and sensory development of boar taint.

Contrary to expectation, in a large-scale study², MLC research showed no significant increases in average fat skatole levels (0.11ppm) or the percentage of boars (4%) with skatole above the threshold level of 0.25 ppm as slaughter weight was increased from 88 to 103 kg (64 to 76kg carcass). Using trained sensory panellists, cooked loin and fat samples from the two slaughter weight groups scored similarly for boar flavour and androstenone and skatole odour.

Chemical and sensory evaluations of boars slaughtered over a wider weight range, including weights much heavier than the current national average, were recently completed by MLC using fat samples collected from a commercial abattoir. Chemical and sensory evaluations showed no increases in boar taint as carcass weight increased from 70 to 100kg. In this study skatole levels averaged 0.14ppm and around 11% of samples had skatole levels above the threshold level of 0.25 ppm.

Whilst these studies do not point to an increased taint problem as carcass weight in boars is increased well above the current average of 73kg, care is required in applying these results under a wider range of conditions.

- **Controlling boar taint**

The most effective method of controlling boar taint is surgical castration. The disadvantages and advantages of castration have been discussed earlier in this booklet (*see page 15*).

There are a number of advances in biotechnology, which may avoid the need for surgical

castration while retaining the performance advantages associated with boars. In some countries, such as Australia, immuno-castration is permitted, which involves vaccinating boars against the production of androstenone. This method of control is not currently licensed for use in the European Union. Molecular research is exploring the genetic basis for the small percentage of entire males with high skatole levels. If the gene or genes responsible can be located then marker-assisted selection could be used to remove such animals from the breeding pyramid using traditional breeding programmes.

As skatole is of a dietary origin, with a genotype and sex component, there is much published research on management factors for controlling this compound. Some of the risk factors associated with increased levels of boar taint and suggested methods of control are given in Table 6. Many of the control methods may carry an additional cost element for the producer, though producers who seek to maximise growth rates and throughput are likely to benefit from reduced cost of production as well as having a positive impact on the eating quality of pork and pork products.

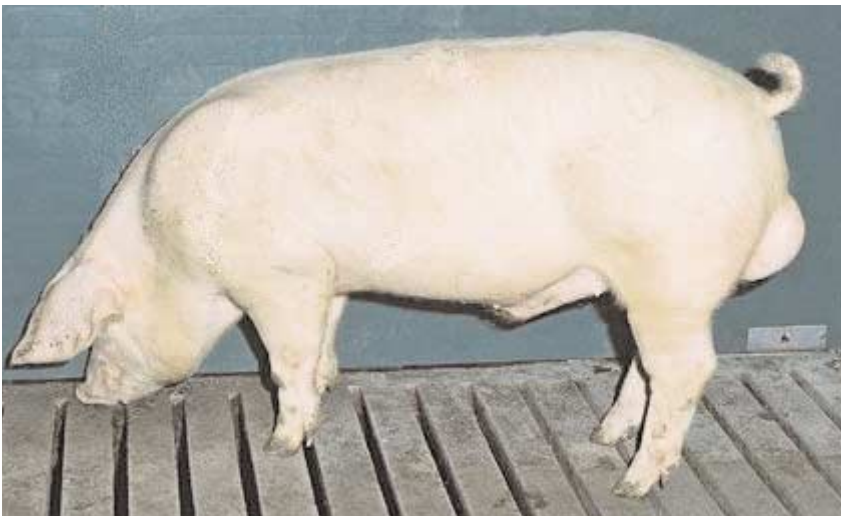


Table 6 Risk factors for boar taint and some methods for control

Risk factor	Control
Dirty pens and high dust levels	Skatole is excreted in the faeces and can be recycled by the pig through skin contact and inhalation of contaminated dust particles. Pen hygiene and ventilation are important management factors in reducing meat skatole levels.
Pellet feeding	Limited MLC studies indicate increased skatole levels in pigs fed the same diet in pellets as compared with meal form. The exact reasons for this are not known, but pelleting is associated with other parameters of gut health such as ulceration, non-specific colitis and a shift in the balance of different types of bacteria in the gut. These may indicate that gut conditions in pellet-fed pigs may be more favourable to the fermentation of tryptophan into skatole. Converting from pellet to meal feeding may therefore reduce skatole levels.
Low fibre diets	A number of studies have now consistently shown that skatole levels can be reduced by increasing dietary fibre content, particularly types of fibre which the pig can readily ferment. For example, the inclusion of dried sugar beet pulp in the finishing diet has been found to reduce skatole levels. Increasing the ratio of barley to wheat in the diet may also reduce skatole levels, as barley contains a higher level of fibre.
High dietary inclusion of peas	A few studies have shown that dried peas are a potential risk factor for increased pig meat skatole levels. It is possible that this may be more to do with fungal contamination due to poor drying and storage conditions rather than peas as a dietary ingredient <i>per se</i> .
Increased pig age for weight	Androstenone production is likely to be positively related to age/weight with the development of sexual maturity as boars get older/heavier. The precise relationship is unclear, but it is probably more related, within breed, to age than weight. Producers, who seek to reduce cost by optimising speed of growth and cutting days to slaughter, are likely to reduce the risk of androstenone associated taint in their pigs. There will also be benefits to meat eating quality, as a reduction in age (at a fixed slaughter weight) results in improved tenderness. There may be a case for setting an upper age limit for pigs entering the premium fresh meat market as a means of controlling taint and improving tenderness. Less thrifty pigs, which would invariably become older, tougher and tainted at slaughter, could then be redirected for processed products. <i>continued</i>

Risk factor	Control
Meishan hybrids	MLC research ² has shown that slaughter generation boars containing 12.5% Meishan have higher skatole levels than Large White x Landrace boars (0.17 v 0.11ppm respectively). The proportion of Meishan cross boars exceeding 0.25 ppm skatole increased from 3 to 19% as average slaughter weight increased from 88 to 103 kg. In Large White x Landrace pigs 4% of boars were above the skatole threshold and this did not increase with increasing slaughter weight. Hybrids with less than 12.5% Meishan may not have increased skatole levels, but this needs to be established.

Additional information can be found in the MLC publication on boar taint⁵.

Legislation and quality assurance requirements

- **Surgical castration**

The recently revised EU Welfare directive 2001/93/EC still permits castration of pigs up to 7 days of age by trained operators. After this date castration must be performed under anaesthetic, with additional prolonged analgesia, by a veterinarian.

In Great Britain legislation regarding pig welfare has been recently amended to fall in line with the revised EU legislation.

Castration is not permitted under the Assured British Pigs scheme or the Specially Selected Scotch Farm Assurance - Pigs scheme.

- **Boar taint testing**

The European legal position on entire male pigs is defined in Council Directive 91/497/EEC. This was implemented in Britain through the Fresh Meat (Hygiene and Inspection) Regulations 1992, which have now been replaced with the Fresh Meat (Hygiene and Inspection) Regulations 1995.

The regulations prohibit the sale of meat from entire male pigs of 80kg carcass weight or over unless an inspector has tested the meat for pronounced sexual odours and declared it not to have such odours. If the meat has not been tested, or has been found to have such odours, it must be treated in accordance with the procedures laid down in Council Directive 77/99/EEC (heating, salting or drying).

The legislation does not define the test that must be used for sexual odours, but the test procedure shall be approved by the Standing Veterinary Committee. It is not clear whether any tests for use in GB have been approved in this manner. In the absence of such a test, Defra recommended that a simple smell test be applied from 1 January 1993.

The carcass weight of 80kg excludes the head and the limbs (from the carpus and tarsus). This is taken to be a carcass weight of 85kg including those parts.



APPENDIX

Modelled physical and financial performance of gilts, boars and castrates at various slaughter weights

Partial cost of production, excluding management and other overheads

	Gilts				Boars			Castrates			
	100	110	120	130	100	110	120	100	110	120	130
Slaughter weight (kg)	100	110	120	130	100	110	120	100	110	120	130
Feed intake (kg/day)	2.00	2.09	2.18	2.25	2.00	2.09	2.17	2.20	2.31	2.40	2.50
Gain (g/day)	723	731	735	736	776	787	793	758	767	773	775
FCR	2.77	2.86	2.96	3.06	2.58	2.65	2.74	2.9	3.01	3.11	3.23
P2 (mm)	11.5	12.7	13.6	14.2	10.4	11.3	12	14.4	15.8	17	17.9
Lean (%) - MLC	58.0	57.3	56.9	56.8	59.1	58.7	58.5	54.7	53.7	53.0	52.6
KO (%)	75.3	76.1	76.9	77.7	73.7	74.3	74.9	75.3	76.1	76.9	77.6
Deadweight (kg)	75.3	83.7	92.3	101.0	73.7	81.7	89.9	75.3	83.7	92.3	100.9
Total feed (kg/pig)	193.9	228.8	266.4	306	180.6	212	246.6	203	240.8	279.9	323
Feed cost (£/t)	115.88	114.55	113.03	111.60	117.28	115.47	114.31	113.10	111.59	110.65	109.13
Feed cost (£/pig)	22.47	26.21	30.11	34.15	21.18	24.48	28.19	22.96	26.87	30.97	35.25
Carcase weight (kg)	75.3	83.7	92.3	101.0	73.7	81.7	89.9	75.3	83.7	92.3	100.9
Carcase lean (kg)	43.7	47.9	52.5	57.4	43.6	48.0	52.6	41.2	44.9	48.9	53.0
Slaughter weight sold (t)	329.4	333.0	334.9	335.3	353.5	358.6	361.3	345.3	349.4	352.2	353.1
Pigs sold	3294	3028	2791	2579	3535	3260	3011	3453	3177	2935	2716
Weaner cost (£/pig)	36	36	36	36	36	36	36	37	37	37	37
Weaner cost (£000/annum)	118.6	109.0	100.5	92.9	127.3	117.3	108.4	127.8	117.5	108.6	100.5
Feed cost (£000/annum)	74.0	79.4	84.0	88.1	74.9	79.8	84.9	79.3	85.4	90.9	95.7
Fixed/variable (£000/annum)	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
Vaccination (£000/annum)	3.3	3.0	2.8	2.6	3.5	3.3	3.0	3.5	3.2	2.9	2.7
Total cost (£000/annum)	226.3	221.7	217.6	213.9	236.0	230.8	226.6	240.9	236.4	232.8	229.3
Total (£/pig)	68.69	73.24	77.99	82.92	66.77	70.79	75.27	69.75	74.43	79.31	84.43
Partial cost/kg DW (p)†	91.2	87.5	84.5	82.1	90.6	86.6	83.7	92.6	88.9	85.9	83.7
Partial cost/kg lean (p)†	157.3	152.8	148.6	144.4	153.2	147.5	143.1	169.5	165.6	162.3	159.2

† Note: These calculations are based on finishing fewer pigs to heavier slaughter weights with the same building space and therefore absolute fixed costs remain constant but increase per pig finished. The costs also exclude the additional working capital required for heavier pig production and maintenance costs (eg building and equipment wear and tear) associated with the management of heavier pigs.

Further information regarding specific aspects of heavy pig production can be obtained from:

Production	Pinder Gill (MLC)	01908 844142
Meat quality	Kim Matthews (MLC)	01908 844176
Veterinary	Derek Armstrong (MLC)	01908 844216
Haulage	Roger Wrapson (Road Haulage Association)	01932 838910
Butchery and New Product Development	Keith Fisher (MLC)	01908 844120
Retail	Chris Leeman (MLC)	01908 844129
BPEX Contact	Andrew Knowles (BPEX)	01908 844708

Additional published information

- ¹ Pig cost of production in selected countries, BPEX 2002
- ² Phase-feeding: Effects on production efficiency and meat quality, Meat and Livestock Commission
- ³ Stotfold Pig Development Unit First Trial Results, Meat and Livestock Commission
- ⁴ Guide to innovative and versatile pork cuts, Meat and Livestock Commission
- ⁵ Boar taint. What can we do about it? Meat and Livestock Commission

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NOTES



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