

NUTRITIONAL MANAGEMENT OF THE GILT FOR LIFETIME PRODUCTIVITY - FEEDING FOR FITNESS OR FATNESS?

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ABSTRACT

Premature culling of sows, primarily due to reproductive failure and lameness, remains a major constraint to capturing the potential lifetime productivity of replacement gilts. On many farms, a lifetime productivity of between 30 and 40 piglets per sow is the norm and only a few sows will achieve the potential of 60 or more. Current feeding and management recommendations for improving longevity continue to focus on the importance of fatness in gilts at first service. This rationale is explored by reviewing the literature, including studies with modern genotypes on the long-term benefits of nutritionally enhancing fatness in gilts and young sows. It is proposed that emphasis should shift from fatness to more holistic thinking towards the concept of fitness, which includes feeding and management of gilts and young sows for body condition, and soundness of legs and feet. In modern lean genotypes changes in body condition will primarily arise from gains and losses in lean mass and to a lesser extent body fatness. Longevity will be improved by avoiding rapid weight gain before first service, provision of flooring and bedding which promotes the development of healthy legs and feet, and a nutritional and feeding programme which aims to achieve a body condition score (BCS) of 3 at first service and farrowing, limits weight loss during lactation and re-conditions young sows during subsequent pregnancies to farrow with a BCS of 3.

INTRODUCTION

Sow lifetime productivity is important to herd profitability. However premature disposal of gilts and young sows result in most sows producing only 30 to 40 piglets per lifetime against the potential for 60 or more. In this paper, the reasons for premature disposal are reviewed. Current feeding and management recommendations for enhancing lifetime productivity are considered. The rationale behind the focus on fatness is explored by reviewing the literature, including studies with lean modern genotypes on the long-term benefits of nutritionally enhancing fatness in gilts and young sows. The concept of fitness is introduced as an alternative to fatness, which takes a holistic approach in managing body condition through feeding and nutritional programmes which are aligned to the lean gain potential of modern genotypes and the increasing evidence supporting the role of body lean in reproductive function. Fitness also includes the provision of flooring systems which promote the development of healthy feet and legs as around 16 to 17% of first and second litter sows are culled for lameness.

PREMATURE CULLING

In many commercial units sow output falls considerably short of the potential to produce 60 to 70 piglets weaned per lifetime, with 40 to 50% of sows culled before reaching their third or fourth parity (Dijkhuizen et al., 1989; Rodriguez-Zas et al., 2003) and weaning only 30 to 40 piglets per lifetime (Lucia et al., 2000). Maiden gilts and first and second parity sows together can account for around 45% of total culls (D'Allaire et al., 1987; Lucia et al., 2000) resulting in a herd inventory dominated by a high proportion of young females, which have yet to fulfil their lifetime reproductive potential. Herds with high replacement rates also need larger gilt pools, with higher overhead and operating costs and adding further inefficiencies to the system as non-productive days. Purchased replacement gilts are also a potential vector of disease as identified in a recent retrospective cohort study of post weaning multisystemic wasting syndrome (PMWS) on pig farms in Great Britain (Green, 2005)

Sow longevity has a major impact on herd profitability, with premature disposals estimated to represent around 16% of farm income (Dijkhuizen et al., 1989). To improve financial return, the productive lifespan of each sow in the herd must be increased, since net present value per gilt purchased improves with parity number (Lacy et al., 2007). In general a reduction in premature culling and the loss of sows in early parities give producers the scope for increasing their profitability. The financial incentive to extend sow productive lifespan increases as replacement gilt costs rise, net income per litter and cull sow value fall, and sow productivity deteriorates (Rodriguez-Zas et al., 2006; Lacy et al., 2007).

In Denmark, the probability of a first litter sow remaining in the herd until insemination for the second is included as a trait for longevity in the national breeding programme. The current rate of genetic progress for longevity is reported as 0.82% per year averaged over 4 years and the economic benefit of this is given as 0.85 DKK (0.17 CAD) per finished pig for every 1% improvement in longevity (Danske Slagterier, 2006).

Recent and historic farm records and survey data show consistency in the reasons for overall sow disposal across pig producing countries (Table 1), with reproductive failure being the predominant reason followed by low productivity, poor health and locomotion.

Analyses of within parity culling patterns show that reproductive failure and lameness are the major reasons for the disposal of young sows, accounting for about 42% and 17% of first and 35% and 16% of second litter culls respectively (Dagorn and Aumaitre, 1979; D'Allaire et al., 1987; Dijkhuizen et al., 1989; Stein et al., 1990; Lucia et al., 2000). As commercial breeding inventories are represented by a high proportion of young sows, which are prone to reproductive failure and the accumulation of non-productive days, an improvement in lifetime productivity can only be achieved by a reduction in the wastage of maiden gilts and first and second litter sows.

Table 1. Reasons (%) for culling sows from commercial herds (all parities).

	Britain ⁴	USA ³	France ¹	Netherlands ²
Reproductive failure				
Failure to conceive	17.84	24.6	31.0	25.2
No oestrus	7.77	9.1	5.4	9.0
Total	25.61	33.6	36.4	34.2
Low productivity				
Old age	28.51	8.7	27.2	11.0
Small litters	2.08	14.1	4.0	6.2
Health/physical damage	7.66	3.1	-	16.0
Mothering ability	3.84	4.9	8.4	13.9
Lameness/leg weakness	7.34	13.2	8.8	10.5
Death	5.47	7.4	6.5	-
Aborted	1.89	-	2.8	-
Miscellaneous	17.60	15.0	5.9	8.2

(Source: ¹Dagorn and Aumaitre, 1979; ²Dijkhuizen et al., 1989; ³Lucia et al., 2000; ⁴MLC, 2005b)

CURRENT RECOMMENDATIONS

The rationale behind current nutritional standards and targets for age, weight and fatness at first mating is to ensure that gilts have reached sufficient maturity and have adequate reserves of body lean and fat which can support reproductive performance over several parities. For example, Close (2003) recommends that gilts should be first mated at the 2nd or 3rd oestrus, when they are between 220 and 230 days of age, weighing between 130 and 140 kg with 16 to 20 mm backfat thickness at P2. Whittemore (1998) has placed importance on the need to achieve adequate stores of fat at the start of the breeding life and has recommended a backfat depth in excess of 18 mm (>17% body lipid) at this stage. A target weight of around 130 kg and an age of 220 days at first mating are suggested for optimum subsequent fertility and longevity. An outline of the nutritional strategy to achieve these targets is based on a combination of reduced protein levels in the diet to limit lean gain and encourage fat deposition and feed restriction to restrict growth and allow attainment of maturity.

Whilst these age, weight and fatness targets appear to be universally known to pig producers, vets and nutritionists, it would be interesting to establish the extent to which they are followed and how many gilts are weighed and measured for fatness to ensure that they fall within the recommended limits. As Foxcroft et al. (2005) conclude, “age is not a good measure of weight or fatness, and the only way to be certain that gilts are at target weight for breeding is to weigh them.” By inference this would also apply to fatness.

FATNESS

It would be reasonable to conclude that current recommendations and thinking over gilt rearing continue to be dominated by the importance of fatness at first mating to lifetime productivity. This raises the following questions:

What is the intrinsic relationship between fatness at first mating and lifetime productivity?

What is the effect of manipulating fatness at first mating on lifetime productivity?

Fatness and Lifetime Productivity

There are few published studies on the intrinsic relationship between fatness at first mating and lifetime productivity of the gilt, because such studies require a large number of animals and the time taken to complete the work may extend over several years. Additionally the interpretation of any findings, such as a positive correlation between fatness and lifetime productivity, requires caution: correlations do not prove causation and may be confounded by other factors such as age and weight at mating.

In a large scale study, Gaughan et al. (1995) found that gilts with backfat depths of between 9 to 13 mm at selection farrowed fewer litters and produced fewer lifetime total born alive (2.81; 24.03) than gilts with depths of 14 to 16 mm (3.47; 30.86) and ≥ 17 mm (3.75; 32.76) respectively. These results would indicate a lifetime difference of an extra 9 piglets born alive associated with an extra 6 mm of backfat in gilts before exposure to the boar at 165 days of age. Similarly Challinor et al. (1996) reported an increase in the number of lifetime born alive from 51.2 to 59.8 as mean P2 backfat depth increased from 14.6 to 21.7 mm at first mating. However in this study gilt body weight at first mating had statistically a more significant correlation with lifetime born alive than P2.

In contrast, a retrospective analysis of the data from a study conducted by the Meat and Livestock Commission (MLC; see below) showed no relationship between gilt backfat depth at first mating and lifetime productivity for all animals and for those able to successfully complete their sixth parity (Figures 1 and 2). There were also no evidence supporting a positive relationship between mean fatness at first mating and the number of parities completed at disposal as a measure of longevity (Figure 3). It is also worth mentioning that as with fatness, we found no clear relationship between gilt body weight at first service and lifetime productivity and longevity. Similarly Rozeboom et al. (1996) and Williams et al. (2005) found no differences in lifetime reproductive performance recorded over three parities that could be related to body composition of gilts at first service, with Foxcroft et al. (2005) concluding that it is hard to suggest that there are any inherent differences in lifetime reproductive performance that can be ascribed to the relative leanness of the sows *per se*.

Manipulating Fatness and Effects on Lifetime Productivity

An alternative approach to understanding the role of fatness in lifetime productivity is from the manipulation of backfat at first mating for the study of any long-term effects on sow reproductive performance. Such an approach may hold greater scope and value in females

from genetic lines selected for increased lean content, as a reduction in fatness in these genotypes has been associated with a fall in reproductive performance (Nelson et al., 1990; Kerr and Cameron, 1995).

Figure 1. Lifetime productivity and backfat at first service.

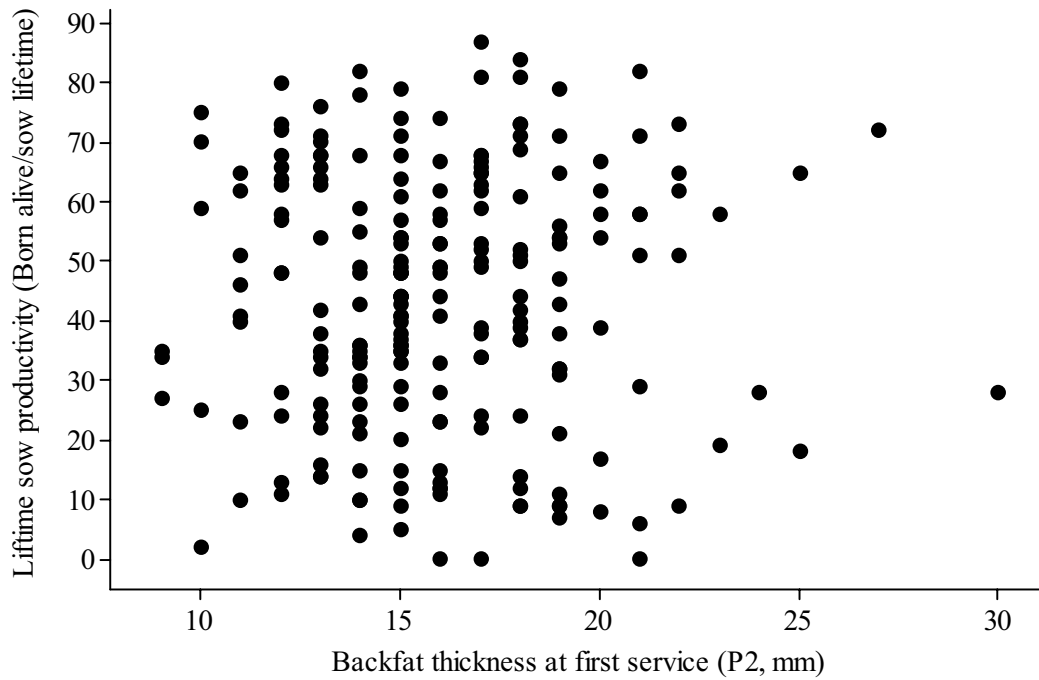


Figure 2. Productivity from sows completing 6 parities and backfat at first service.

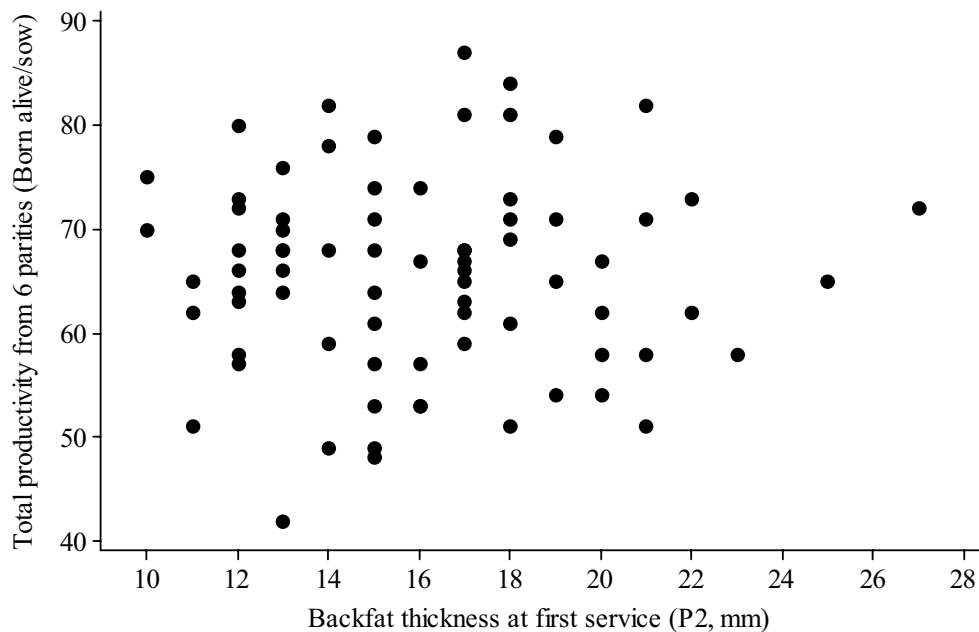
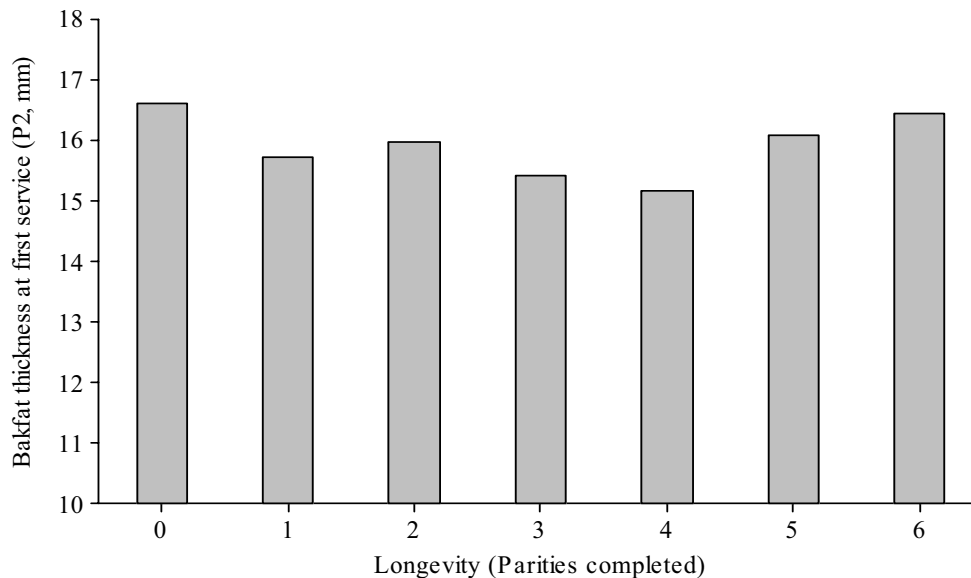


Figure 3. Longevity and backfat at first service.



Fat manipulation studies in gilts genetically determined to achieve high P2 values have mainly employed intake restriction or dietary energy diluent treatments to reduce fatness. In lean gilts, where an adjustment in feed allowance may simply shift body weight and not composition, manipulation strategies have aimed to increase fat deposition by reducing dietary protein content, thus partitioning net energy in favour of lipid deposition.

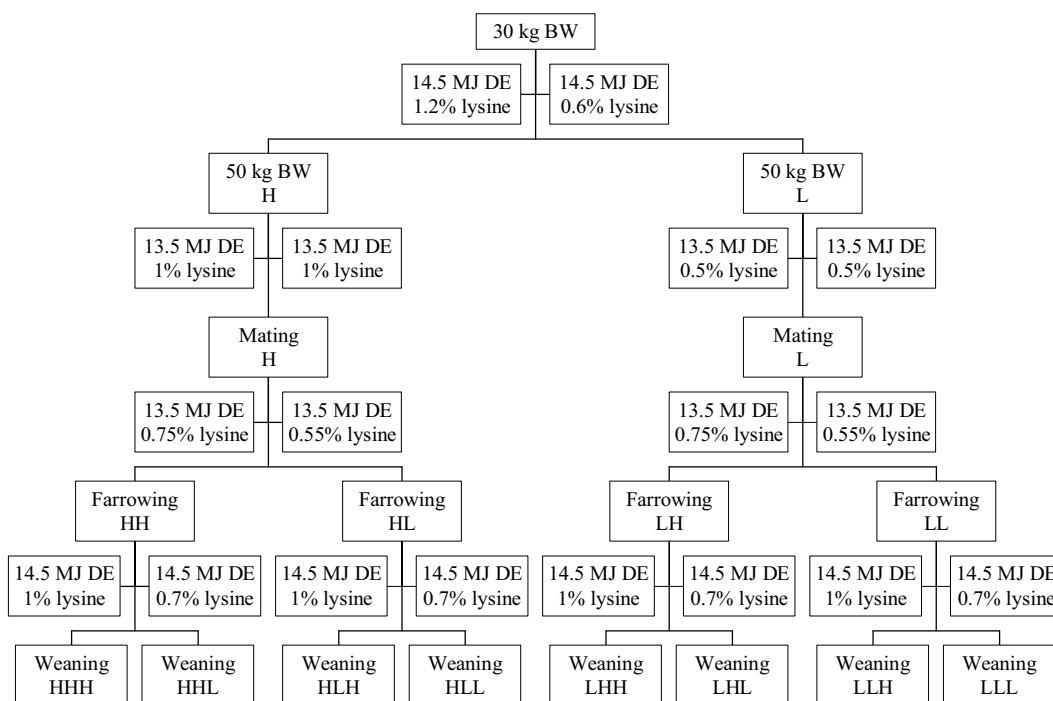
Studies using feed allowance treatments to investigate the effects of fatness on lifetime litter productivity have generally proved inconclusive (Simmins et al., 1992; Sorensen et al., 1993; Rozeboom et al., 1996). Longevity can be reduced due to culling for lameness and reproductive failure, where feeding allowance results in animals with body condition extremes (Danielsen et al., 1993). This is likely to interact with housing, where the provision of an optimal physical and thermal environment diminishes the risk of premature culling associated with feeding allowance effects on body condition (Simmins et al., 1993; Dourmad et al., 1994).

In Britain, the development of ultra lean genotypes has been driven by consumer pressure and producer payments based on tight processor carcass P2 and weight specifications. There has been concern over the negative effects that this may have on longevity and lifetime productivity of replacement gilts for the production of slaughter pigs with P2 values currently averaging 11.0 mm with a carcass weight of 74.4 kg (MLC, 2006). This led to research at Aberdeen on the long-term benefits of nutritionally enhancing and conserving fatness in gilts by feeding a low protein diet (11.3% CP; 0.45% lysine; 13.0 MJ DE/kg) before and during pregnancy to restrict lean gain and increase fat deposition and the provision of a high-nutrient density diet (18% CP; 0.95% lysine; 14.8 MJ DE/kg) during lactation to limit fat loss (O'Dowd et al., 1997). The implementation of this strategy over three consecutive parities did not influence litter size and performance but significantly reduced the first weaning to

conception interval and number of sows culled for reproductive failure, especially before the second pregnancy. These sows had reduced P2 and weight losses in lactation and maintained a P2 advantage of around 3 mm over 3 parities resulting in 18 mm following weaning of the third litter compared with 15 mm for sows fed a single diet in pregnancy and lactation containing 16% CP, 0.75% lysine and 13.0 MJ DE/kg.

The MLC further investigated the scope for increasing fat levels in commercial replacement gilts before first service by introducing them to a low-protein diet at around 30 kg, much earlier than the 105 kg live weight used in the Aberdeen study. Using a low (L) versus high (H) dietary lysine treatment comparison during rearing (30 kg to first mating), pregnancy and lactation, the MLC study subjected gilts to 1 of 8 different nutritional pathways from 30 kg to weaning of the first litter (Figure 4). Thereafter all sows were fed and managed according to standard commercial procedure. Longevity, sow and reproductive performance and reasons for culling were monitored over 6 parities. A total of 361 Large White x Landrace gilts from 4 major breeding companies were placed on trial and 75 were serially slaughtered for determination of dietary effects on body composition at 30, 50 and 90 kg body weight and at mating, farrowing and weaning of the first litter (Gill, 2006). Further details have been described by Edge et al. (2003).

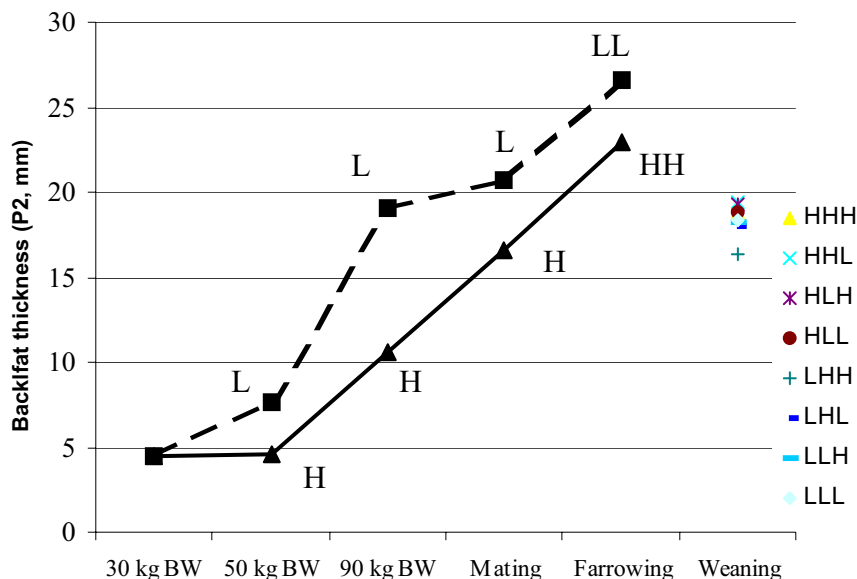
Figure 4. Diagram illustrating the dietary treatments fed to gilts from 30 kg BW to weaning of the first litter. The high (H) or low (L) designation indicates a high or low lysine diet from 30 to 50 kg BW, from 50 kg BW to mating, during pregnancy and lactation.



The key findings of the study are as follows:

- From 30 kg BW to mating at either 3rd or 4th oestrus, L fed gilts had reduced daily gain (632 vs. 749 g/day), reached first oestrus 10 days older and were lighter at service (123.8 vs. 136.7 kg BW).
- Gilts fed L diets during rearing and pregnancy remained around 4 to 6 kg BW lighter at weaning the first litter and the effect of the L rearing diet on sow BW remained through to weaning of the 6th litter (234.6 vs. 243.8 kg BW).
- Serial slaughter showed that L fed gilts were fatter at mating (20.73 vs. 16.53 mm P2), but P2 differences across treatments were reduced at farrowing, with no evidence of residual rearing, gestation and lactation dietary treatment effects on P2 at weaning the first litter (Figure 5).
- Gilts fed diet H during pregnancy produced increased number born alive at their first litter (10.26 vs. 9.47) but there were no other significant treatment effects on litter productivity within parity, lifetime productivity (averaging 39 born alive) or total productivity (averaging 65 born alive) of sows that successfully completed 6 parities.
- Feeding the H diet during rearing, tended to reduce sow longevity, with lameness being the major reason for culling sows on this dietary treatment (Figs 6 and 7).

Figure 5. Changes in body fatness (P2) during rearing, at mating, farrowing and weaning according to high (H) and low (L) lysine dietary treatments.



In conclusion, this study has shown no lifetime or total 6 parity litter productivity benefits from increasing fatness in lean gilts at first mating by dietary adjustment of protein intake during rearing. Dietary achieved increases in fatness were transient. Any residual effects disappeared by weaning of the first litter. The potential protective benefits to sow longevity from feeding a low protein diet during gilt rearing are probably the result of the long-term reduction in sow body weight and in turn reduced risk of foot and leg injury rather than any cushioning role of fatness. The research points to the potential benefits of rearing gilts on diets formulated to meet protein requirements for the early attainment of puberty,

accumulation of lean mass for body condition and during first pregnancy higher protein diets to meet lean growth requirements for body condition and increased number born alive. However adjustments in intake may be required to control rapid gains in body mass and limit the risk of lameness under this strategy.

Figure 6. Percentage of sows remaining in the herd by parity according to high (H) and low (L) lysine dietary treatment before first service.

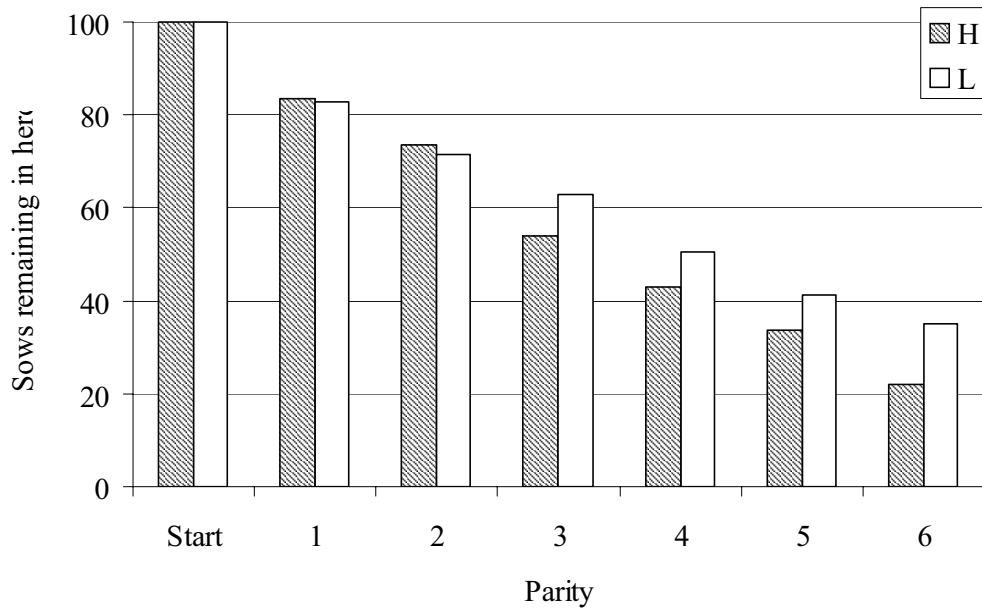
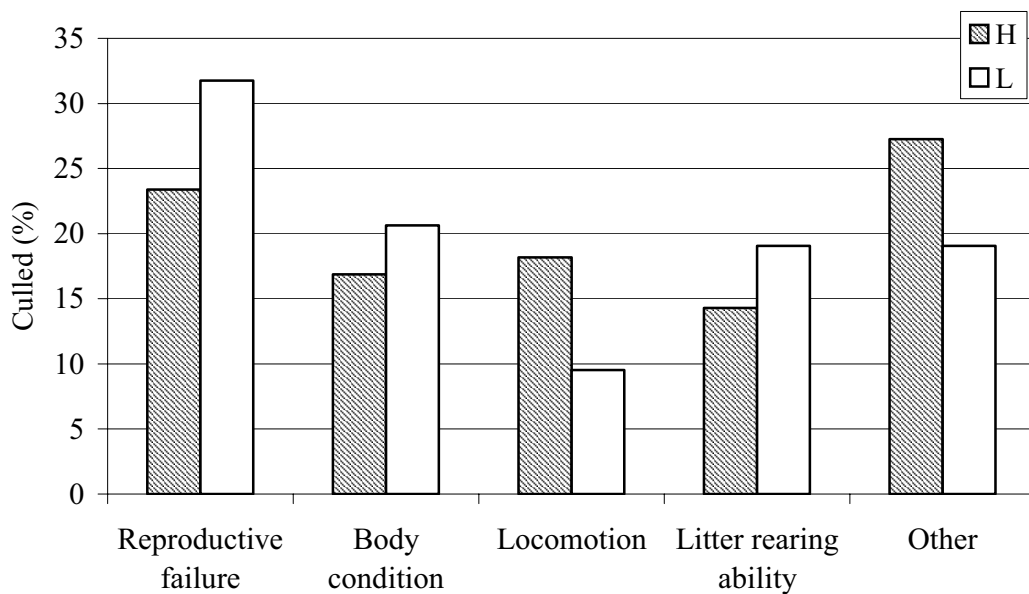


Figure 7. Culling pattern according to high (H) and low (L) lysine dietary treatment before first service.



Our conclusions would support the work of the Alberta group recently summarised by Foxcroft et al. (2005) in that from a fertility and prolificacy perspective, fatness is simply not the key risk factor and in contrast, lean tissue mass is a key consideration for correct management of the gilt, and the lactating and weaned sow.

FITNESS

It is tempting to suggest that historic and to some extent continued focus on fatness has been detrimental to our thinking over the importance of other factors which may exert greater influence on sow longevity and productivity. A more holistic approach would be to consider how we could improve the overall well being and fitness of gilts and sows and therefore their robustness against environmental factors, which may predispose them to premature reproductive failure and lameness. Two important components of fitness that will be considered in this paper are body condition and the soundness of legs and feet.

Body Condition

Whilst body condition scoring (BCS) may not be an ideal substitute for weighing and measuring fatness in sows, BCS is a very easy and practical method for assessing the fitness of each animal at critical stages of its reproductive life. Scoring at gilt selection, mating, mid-pregnancy, after farrowing and weaning enables timely adjustments in feeding allowances or modifications to diet formulations to avoid subsequent problems associated with poor condition scores. Sows with high scores (e.g. ≥ 4) will be at increased risk of lameness, reduced appetite during lactation and excessive weight loss, resulting in an extended weaning to conception interval. Pre-weaning mortality of pigs was found to be higher on farms with sows scoring 4 or 4.5 for body condition (Defra, 2005). Sows with low scores (e.g. ≤ 2) may fail to return to oestrus, have prolonged weaning-to-oestrus intervals, reduced conception rates and may be at increased risk of physical damage such as the development of shoulder sores during nursing of their piglets.

In pigs, BCS provides an overall assessment of muscularity together with a general but poor indication of the amount of subcutaneous fat cover on the animal. Unless there is an excessive layer of fat present, it is extremely difficult to accurately assess fatness or fat depth in pigs by visual assessment or feel. The potential for confusing fatness with muscularity is illustrated in the photographs (Figures 8 and 9) of pre-pubertal gilts on the MLC study described above. Gilts visually considered to be 'thin' and in poor body condition (e.g. <2) were on the low-protein rearing diet with P2 values around 4 to 5 mm greater than their contemporaries which were fed the high-protein diet giving increased lean deposition, greater muscularity and a rounder 'fatter' appearance with a condition score of around 3. The body lipid content of the poorer scoring gilts was around 4 to 8% higher than in the better scoring gilts.

Potential misconceptions over BCS and fatness can lead to incorrect management interventions with potentially serious consequences for the well being and productivity of the overall herd. For example, young sows in poor body condition score (e.g. <2) after weaning their first litter may be fed low protein diets during pregnancy to encourage fatness or limit

body gain, a strategy which is exactly in reverse of the need to increase protein intake to support the continued requirement for lean growth, muscle mass and improved body condition at farrowing. Under this situation sows already lacking muscle mass may further lose body condition as an essential protection from the physical environment, predisposing them to shoulder sores in farrowing crates.

Figure 8. Gilts fed low lysine diets during rearing.

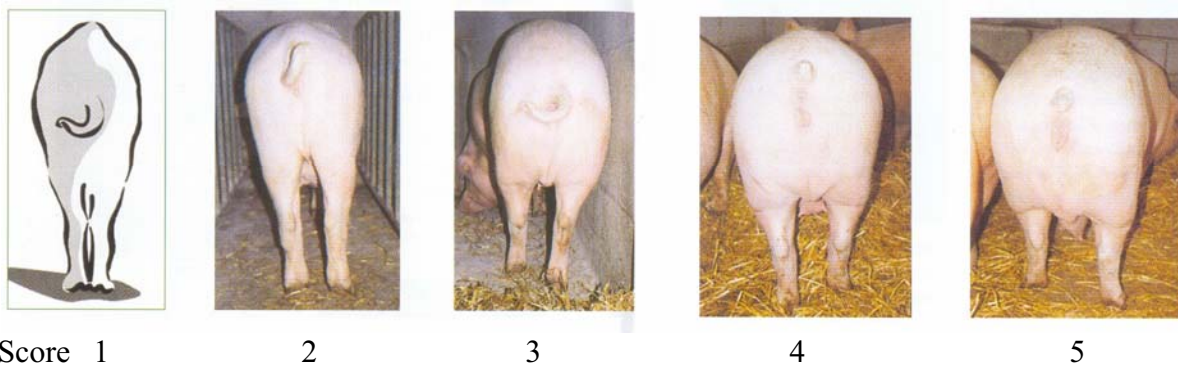


Figure 9. Gilts fed high lysine diets during rearing.



The general advice, when using a typical BCS ranging from 1 to 5 (Figure 10), is to aim for a body condition score of 3 at farrowing, which may fall to 2.5 at weaning with adjustments in individual feeding allowances according to an individual's condition score over the subsequent pregnancy for all sows to return to a score of 3 again at farrowing.

Figure 10. Body condition scores for sows (typical 1 to 5 scale)



Sound Legs and Feet

After reproductive failure, lameness is the second cause of premature culling of young sows, with around 16 to 17 % of first and second litter sows removed for this reason (Dagorn and Aumaitre, 1979; D'Allaire et al., 1987; Dijkhuizen et al., 1989; Stein et al., 1990; Lucia et al., 2000). In one survey of farm records (Boyle et al., 1998), problems with locomotion accounted for nearly 32% of all first parity disposals.

Lameness may also be the underlying problem explaining a proportion of young sows removed for failure to show heat and conceive as the reproductive physiology of an animal may be impaired by stress and pain. At insemination pain may interfere with the release of oxytocin for uterine contractions and effective transport of sperm to the site of fertilisation. Lamé sows may be less reluctant to stand for feeding and drinking, predisposing them further to body condition loss, urinary and genital infection and reproductive failure. Additionally, lame sows represent a significant risk factor in the mortality of piglets before weaning from overlying (Defra, 2005) as lameness reduces agility and the sow's ability to move away from piglets at risk and respond rapidly to distress calls from piglets during crushing.

Rapid growth and increased body weight before mating and excessive body condition scores (>4) predispose gilts and young sows to lameness, presumably because of skeletal immaturity and the additional body weight burden on legs and feet. In these sows, natural mating may further increase the risk of foot and leg injury as the sow may support up to 50% of the boar's weight on her hind legs.

Sow body weight and skeletal maturity as risk factors for leg and foot injury cannot be taken in isolation of the interaction and impact of the physical environment, particularly floor type, quality and repair. In a comparison of two contrasting flooring types, MLC research found a significant increase in bursitis scores and the prevalence of lameness in finishing pigs housed on fully-slatted compared with straw based housing. The number of pigs removed for lameness was almost two-fold greater from the fully-slatted compared with the straw based system. Flooring type was associated with different patterns of foot damage; pigs on straw had poorer scores for toe erosion, while those kept on fully-slatted flooring had more severe sole and heel erosions (Scott et al., 2006). Field experience further suggests that with liquid feeding, spillage of feed containing high levels of soluble non-starch polysaccharides onto plastic slats can create a hazardous flooring surface resulting in high levels of leg injury from slippage.

These studies and observations suggest that gilts reared on different flooring systems may go on to develop different forms and severity of lameness on transfer to the breeding herd after mating and that flooring type in the breeding unit represents an additional risk factor for the premature disposal of sows due to locomotion. Boyle et al. (1998) concluded that lameness was a major welfare problem, possibly resulting from gilts failing to adapt to changes in housing and flooring system following transfer from the gilt pool to the breeding herd.

Attainment of Reproductive Function

It is not within the scope of this paper to review many of the various factors which can influence the attainment of puberty in maiden gilts as these have been addressed comprehensively in the published literature (e.g. Gordon, 1997). One aspect within the theme of this paper is to consider if there are any secondary factors that may interfere with the expression of reproductive function, for example failure to show heat, and result in the premature disposal of gilts which are otherwise fit for breeding.

A number of studies have shown that the quality of the aerial environment can influence the attainment of puberty. For example, Malayer et al. (1987) found that a reduction in aerial ammonia concentration from 21 to 5 ppm significantly increased the percentage of gilts reaching puberty by 29 weeks of age (20 vs. 35%). Higher ammonia concentrations were considered to depress the gilt's ability to detect boar olfactory signals, as hormonal patterns associated with the onset of puberty were not affected. In a subsequent study (Malayer et al., 1988), a higher proportion of gilts attained puberty within 7 to 10 days after boar contact from 26 weeks of age when exposure to aerial ammonia was reduced from 20 to 6 ppm from 10 weeks of age. Sensitivity to ammonia in pre-pubertal gilts declines with age but exposure to high concentrations (35 ppm) from 18 to 24 weeks of age can reduce body weight at puberty and potentially number born alive (Diekman et al., 1993). These studies also raise the possibility that other undersirable aerial gases and dust may interfere with sensory receptors for boar olfactory cues and the attainment of puberty in gilts. Where aerial ammonia concentrations are potentially interfering with the gilt's sensory detection of male pheromones, earlier attainment of puberty and the quality of the insemination process could be improved by strategic use of low protein amino acid supplemented diets as this is known to reduce effluent ammoniacal nitrogen content and ammonia emissions (Portejoie et al., 2004; Leek et al., 2005; MLC, 2005a). However it is important that such diets are formulated to meet amino acid requirements for lean gain and subsequent productivity.

GENERAL RECOMMENDATIONS

One size does not fit all and this is very much a universal conclusion when making recommendations for pig production, including feeding and management of gilts to optimise longevity and lifetime productivity. The recommendations that follow (Table 2) are intended to assist producers in working towards the goal of achieving fitness in gilts from the point of first mating and management through to weaning of the first litter, the first critical steps in establishing the young sow to produce 60 or more born alive.

CONCLUSIONS

Premature culling of young sows for reproductive failure and lameness remains a barrier to achieving a lifetime productivity of 60 or more born alive per sow lifetime. With the development of lean genotypes, current recommendations may need to shift from a focus on fatness to one of fitness, where fitness includes feeding for body condition as a practical

indicator of lean mass and to a lesser extent fatness, and the development of sound feet and legs. Management of the young sow to avoid extreme fluctuations in body condition and the negative effects this has on reproduction and locomotion is central to the goal of improving lifetime productivity. In future, we may have to take a more holistic approach in managing replacement breeding stock and young sows as a precious resource in the sustainable production of pork and pork products.

Table 2. Recommendations to assist producers in working towards fitness in gilts.

Stage	Recommendations
Rearing (30 kg to 100 kg)	Gilts should be fed <i>ad libitum</i> standard grower (30 to 60 kg BW) and finisher (60 to 100 kg BW) diets. They should be housed on good quality flooring, preferably solid concrete with bedding, with floor space that encourages exercise and the development of sound feet and legs.
Selection to first service (100 kg to around 135 kg BW)	Gilts should be fed a finishing diet (0.8% lysine, 13.5 MJ DE/kg) to support continued requirements for lean (and fat) deposition but intake should be restricted to around 80 to 90% of appetite to control rapid weight gain and reduce the risk of lameness. The aim should be to achieve a body condition score of 3 at first service at either the 2 nd or 3 rd oestrus. Leg and foot injury must be prevented by housing on good quality solid flooring and the provision of adequate bedding for physical comfort. Space allowance should allow exercise and movement for the development of sound feet and legs. Ammonia levels must be controlled to optimise olfactory communication between gilts and boars, to stimulate the attainment of puberty and a high quality insemination. The importance of a well managed Gilt Development Unit to ensure a consistent flow of high quality gilts into the breeding herd and the positive impact this has on herd parity profile and key indicators of performance has been discussed at a previous London Swine Conference by (Foxcroft, 2005).
First pregnancy	During first and into the second pregnancy, the young sow is still genetically programmed to gain lean mass. She should be fed a diet containing 0.7 to 0.8% lysine and 13.5 MJ DE/kg, and daily allowance controlled to ensure that a body condition score of 3 is held through to farrowing. Avoid over feeding, as sows scoring higher than 3.5 will have difficulty farrowing, reduced appetite during lactation, excessive weight loss and delayed return to oestrus. Flooring quality must promote sound locomotion.

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First Lactation	High feed intake at this time is critical to meet litter demands and avoid excessive weight loss and subsequent reproductive problems. A diet containing 1.0% lysine and 14.5 MJ DE/kg should be fed to meet protein and energy requirements. Daily feed allowances should follow the developing appetite curve of each sow, based on day of lactation and number of piglets nursed, as in the MLC's Stotfold Sow Feeding Strategy (MLC, 1998).
Weaning to rebreeding	Sows can continue to be fed the lactation diet at around 3 to 4 kg per day.
Second pregnancy	For sows that have lost excessive body weight during lactation, this is a critical time to re-condition them using a diet that helps the recovery of body mass, largely consisting of lean in lean genotypes. A diet containing 0.7 to 0.8% lysine and 13.5 MJ DE/kg will help lean recovery with daily allowances adjusted to achieve a body condition score of 3 at farrowing. Failure to re-condition sows will increase the risk of shoulder sores developing during the ensuing lactation. In subsequent parities, lysine content should be dropped to 0.6% with feeding allowances always targeting a return to a body condition score of 3 at farrowing.

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