

# 30 pigs/sow/year – Impacts on the Sow

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## ■ Introduction

Since the early 1990s, the application of genetic selection for litter size has led to an increase of up to 3.5 pigs per litter at dam line nucleus level, with the largest improvements shown in the French and Danish breeding programs. This has translated into the potential for a total litter size born of 15 or more piglets, providing the possibility for commercial producers to wean more than 30 pigs/sow/year (psy). I have previously described the management practices used to produce 30 psy, including a number of novel techniques developed in Denmark (Peet, 2005a, Jensen and Peet 2006). Recently, at least two breeding herds in Canada have produced 30 psy for a period of one year. There seems no doubt that, with the genetic lines available today, this figure will become the new benchmark for the world's top producers. However, there are a number of disturbing negative aspects of the rush towards increased sow productivity, which have implications for the sow and also her progeny's health, growth, efficiency and carcass quality.

Foxcroft (2007) described the phenomenon of pre-natal programming, and suggested that the large increase in ovulation rate in modern, higher parity, sows leads to uterine crowding, intra-uterine growth retardation in the embryo and foetus and a reduction in muscle fibre numbers. In practice, this leads to a number of problems, including lower immune status (Harding et al., 2006), and slower growth and poorer carcass quality in pigs from litters with a low average birthweight (Foxcroft et al., 2007). This appears to be a direct consequence of selection for total numbers born and, indirectly, for ovulation rate. The other negative change that has taken place over the period that litter size has been increasing is that sow death rates have gone up significantly, especially in North America (Peet, 2005b). While there is a wide range of factors involved, increased productivity seems to have reduced sow longevity, also leading to higher culling and replacement rates. There is clearly a need for management of the sow, including nutrition (Ball et al., 2008), and her progeny, to change in response to this knowledge.

## ■ Impacts on Sow Longevity

In many countries around the world, sow longevity is decreasing and sow mortality is increasing (**Table 1**). While the reasons are complex, there seems no doubt that the greater nutritional and physical strain on the sow as a result of the increased productivity, especially in her early life, is a major factor. Also, the decrease in gilt and sow backfat levels as a result of selective breeding for leaner, fast growing and efficient pigs, means that they have less tolerance to deficiencies in management, environment and nutrition. Lean animals are more prone to physical injury, notably shoulder and leg abrasions, which may lead to culling. Another factor is the intensification of production systems leading to harsher conditions, which are more likely to lead to injury, combined with a lack of suitable hospital facilities to deal with sick, injured or disadvantaged gilts and sows.

**Table 1. Sow death and culling rates – 2000 and 2005 \***

	Canada		USA		GB	
	2000	2005	2000	2005	2000	2005
Av. death rate (%)	4.7	8.1	6.9	8.9	3.9	5.8
Top 10% herds	1.5	5.5	2.7	4.8	3.4	3.7
Bottom 10% herds	-----	13.2	-----	13.2	-----	-----
Av. culling rate (%)	41.1	44.5	44.6	51.2	38.1	38.8
Av. replacement rate (%)	49.6	60.3	56.9	63.1	45.9	54.0

\* Source: *PigChamp Benchmarking/MLC*

Sow longevity may be improved by changes to management, nutrition and feeding, and the pig's environment. Some of the practices that should be employed include:

- Breeding gilts at a target weight of 135 -150kg, to farrow at a weight of 180 -190kg.
- Avoiding overfeeding gilts in gestation, which will improve first lactation feed intake.
- Where possible, using a higher lysine lactation diet for gilts (for example in a start-up situation, where all the females are gilts).

- Maximizing lactation feed intake of all females through attention to pre-farrowing feed levels, room temperature, water availability, feed freshness, frequency of feeding and feed scale.
- Feeding gilts and, if necessary second parity sows, 0.5 kg of a top dressing for the last 7 days of lactation and from weaning to breeding. (Typical composition: 50% dextrose, 25% fishmeal, 25% full fat soybean meal, plus added Vitamin E and Phosphorus).
- Paying special attention to flooring surfaces, especially for gilts and young sows, replacing or repairing materials when necessary.

The focus of management should be to nurture the gilt and second parity sow so that she reaches the highly productive 3-6 parity stage, thereby increasing average sow longevity.

## ■ Increasing the Quality of Piglets Born

Foxcroft et al. (2007) reviewed information indicating that when high numbers of developing embryos implant in the uterus early in gestation (up to day 30), those that survive to term develop into compromised pigs with reduced growth potential. Piglets from litters with low average birthweight are all compromised, regardless of their relative birthweight within that litter. There are two aspects of dealing with this situation in respect to the gilt and sow. The first is to improve the nutritional status of the female in order to increase the nutrient supply to the developing embryos. The second is to improve the size and quality of the follicles released in order to reduce the “pre-natal programming” effect. Both of these will help to improve the quality of the piglet born and its growth potential.

The feeding and nutrition related recommendations made above with respect to sow longevity are helpful in reducing the impact of programming; and specific feeding strategies during gestation may also impact embryo survival and fetal growth. Recently, there has been a change in thinking about feed levels in early gestation. Whereas previous recommendations have been to feed relatively low levels at this stage, there is increasing evidence that this may be counterproductive in high-performing sows, reducing the number of surviving embryos. Sorensen and Thorup (2003) showed that a high feed intake in the first 28 days of gestation led to improved numbers born and less sows culled. This is borne out in commercial practice and some farms have also shown an improvement in farrowing rate. However, an additional recommendation for gilts is to feed low levels for at least the first 3 days after breeding. There is little evidence to show that increasing feed intake in late gestation (d85+) can improve birthweight; in any case, it is too late to counteract the effects of any earlier nutrient restriction in the uterus. However, increasing feed intake (typically 2.8-3.0 kg) at this time provides nutrients for

the rapid growth of the foetus that is taking place and stops the sow utilizing her own lean and fat tissues for piglet growth. This is especially important in younger females that are still growing, to avoid them reaching farrowing in a catabolic state. Increased feed levels may also improve piglet viability after birth. Practical experience suggests it is important to reduce feed intakes for at least 3 days prior to farrowing; otherwise udder health and sow appetite may be compromised. The addition of specific nutrients, either throughout gestation or at specific stages may help improve embryo survival. Promising results, in terms of embryo survival rate, have been achieved from the addition of L-arginine and fish oils.

Very high feed levels (3.5kg+) between weaning and breeding has been shown to increase ovulation rate and embryo survival (Ashworth et al, 1999). Despite the fact that this is a well-established relationship, very few producers pay feeding at this stage the attention it deserves.

The most critical stage for the gilt nutritionally is her first lactation, because her appetite is low relative to the demands of milk production. She is also trying to gain body mass at the same time. Despite some loss of body condition, most modern genotypes do not exhibit extended weaning to service intervals and may be mated within 5-7 days post weaning (Foxcroft et al., 2006). However, subsequent farrowing rate and litter size may be improved by employing management practices that improve the nutritional status of the weaned gilt by the time she is bred. This can start during lactation by utilizing a higher lysine lactation diet or feeding a top dressing. Another approach, used extensively in Denmark, is to extend the gilt's lactation length to 30-35 days by using her as a foster mother (Jensen and Peet, 2006). By removing the gilt's own litter at 20 days and fostering on a litter of 5 - 7 day old piglets, the nutritional load on the gilt is reduced considerably, diverting nutrients to restoring her own body tissues.

The alternative to improving nutrition prior to weaning is to delay breeding after first weaning, giving the sow a longer time to improve her metabolic status. The "skip-a-heat" method has been shown to increase total litter size born by as much as two pigs (Clowes et al., 1994), probably by improving follicle size and embryo survival, because ovulation rate and conception rate were not increased in the recent "skip-a-heat" study of Patterson et al. (2006). However, the high cost of maintaining a non-productive gilt for another 21 days has limited the use of this technique commercially. Another approach is to delay the onset of oestrus hormonally using oral progestagens like altrenogest. Patterson et al. (2007) found that delaying breeding by an additional 12 days with altrenogest led to an increase of over 2 fetuses at day 50 of gestation, whereas a 5-day delay resulted in only 0.6 more fetuses at day 50. This technique may be one practical way to avoid the "second litter drop" syndrome. It is also clear that subsequent litter size through later parities is improved where gilt and second litter size is high.

## ■ Implications for Farrowing Management

Foxcroft et al. (2007) suggest that all piglets from litters with low average birthweights are compromised. This poses the question as to how we respond from a management viewpoint. Herds with very high litter size tend to have a disproportionately high number of stillborn piglets, which is likely due to a lack of thriftiness caused by pre-natal influences (**Table 2**). Therefore, close monitoring of farrowing, and management measures to reduce stillbirths, have become essential in herds with high numbers born. This will also lead to a reduction in post-farrowing piglet deaths by increasing piglet viability. Also, measures to increase survival, such as drying piglets off after birth, assisting them to suckle and placing them under a heat source, will be especially helpful to low birthweight litters.

**Table 2. Litter size and stillborn pigs in four countries**

	# Born alive/litter	# Born dead/litter	Stillborn as % of TB
Canada	11.2	0.8	6.7
USA	10.6	0.9	7.8
UK	10.9	0.6	5.2
Denmark	13.2	1.7	11.4

Foxcroft et al. (2007) suggest classifying litters by average birthweight, using the weight of two average piglets from each litter. Low-birthweight litters can then be given special attention to increase their survival, health status and growth potential. In particular, ensuring these litters receive a high colostrum intake, using techniques such as split-suckling, stomach tubing and syringing, will improve their immune status. These management practices at farrowing will help to increase survival rate, piglet health and subsequent growth.

Fostering is a technique widely used to ensure piglets of different sizes and from various sizes of litter receive an adequate milk supply. In the light of recent knowledge on pre-natal programming, it may be necessary to change fostering practices so that cross-fostering only takes place between litters classified as having below or above average birthweights. This would allow special attention to be focused on the low birthweight litters. It would also allow pigs to be grouped according to these categories after weaning and managed differently. However, more information is needed in order to develop management strategies that take into account the implications of the programming effects on growth and carcass quality.

## ■ Conclusions

Increased sow productivity, especially litter size, has led to some negative consequences, notably an increase in sow death rate and higher culling and replacement rates. Also, mature sows with a high ovulation rate may produce low birthweight litters with piglets that have a lower immune status and reduced growth potential. There are a wide range of nutritional and management strategies that can be used to counteract these potential problems. However, further work is required to understand the implications of higher litter size for management systems after weaning and the comparative economics of managing pigs based on their average litter birthweight or according to individual body weight.

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