Feed efficiency – the number one breeding goal for genetic gain

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To say that feed efficiency is important in pork production today is an understatement. Droughts, floods, spikes in global demand, commodities speculation, oil prices, you name it, there is no shortage of factors driving up feed costs. As such, feed conversion efficiency has been top of the agenda for pork producers for some time now and every day it grows in importance.

Contributing factors

There are numerous factors that contribute to how efficiently a hog converts feed into meat. Health, environment, management, floor space, feed specifications, equipment, the list goes on.

All these factors are important and all are worth examining in the current business environment where every cent counts. In this article, we will focus on what genetics does to improve feed efficiency.

Lines versus breeds

To put it simply, some genetic lines are more efficient than others at converting feed into muscle or meat. We have to be careful about saying that certain breeds convert feed more efficiently than other breeds though because there is sufficient variation within breeds today to explain why a line from a breed considered to be less efficient demonstrates better feed efficiency than a line from a breed considered to be more efficient.

The easiest way to explain this is that lines develop over time according to unique breeding objectives and breeding programs. In this case, two lines from the same breed with different breeding objectives or breeding programs could, in time, have significantly different feed efficiency despite the fact that they are still technically the same breed.

So, for instance, a Duroc terminal line developed with an emphasis on carcase leanness and feed conversion efficiency will, assuming an effective breeding program, demonstrate better feed conversion efficiency than a Duroc line developed with an emphasis on meat quality.

Extending this train of thought, it is also possible that a Duroc line could produce more feed efficient pigs than, for instance, a Piétrain line.

Looking at it from another perspective, it is also important to take into account differences in feed, health, environment and market requirements when considering efficiency. Under some of these circumstances Duroc terminal boars will be more suitable and will demonstrate better efficiency than Piétrains.

In addition to feed intake, focus on Residual Feed Intake (RFI) to improve net feed efficiency has been implemented into breeding programs by several breeding companies.

RFI is the difference between actual feed intake and an animal's predicted required feed intake – where the prediction is based on the animal's age, weight and nutritional requirements for maintenance and growth. Animals with high RFI scores are penalised in the breeding program.

This additional information helps to select even more efficient animals than by using standard feed intake and lean growth measurements alone.

However, the ensuing focus on production costs has resulted in the continuous search for better feed efficiency. Because feed consumption is highest in the finishing phase, it is natural that this is the first place the mind goes when thinking about feed efficiency. But are we not overlooking other potentially significant savings?

Feed efficiency of the sow

An SIP Consultants Service report on pork production costs (January 2011) shows that feed amounts to 70% of the cost production for each kilogram of live weight in Spain (Denmark: 61%, France: 59%, Germany: 63%, Holland: 60%).

A sow's feed consumption represents around 10.5% of the cost per kilogram of live weight and represents 30% of the cost of production of an 18kg (39.7lb) weaned pig.

Finishing feed conversion, although very important, is not the only factor to consider.

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It is also critical to bear in mind the feed efficiency of the sow when aiming to maximise total system profitability.

Feed efficiency testing is therefore an important part of dam line breeding programs. Feed intake and lean gain are tested on maternal line boars to estimate feed conversion efficiency.

This improves gestation and lactation feed utilisation by the parent gilt and feed conversion efficiency in F1 barrows and finishing hogs indirectly. For a F1 gilt 1000kg (2204.6lb) per sow per year during gestation/lactation is a reasonable target.

We can also look at this target at the weaned piglet level – in that case 40kg (88.2lb) of sow feed per weaned piglet is a goal already achieved years ago.

Table 1. illustrates the differences in piglet and sow cost based on varying levels of sow feed consumption and production results (SIP cost simulation):

	Average production SIP						
	SIP Average	1000kg consumption		1250kg consumption		Real example Hypor farm	
Fix costs/year (€)	282	282		282		282	
Drugs (€)	46	46		46		46	
Weaned/farrow	10.4	10.4		10.4		11.9	
Weaned/sow/year	24.4	24.4		24.4		28.2	
Litters/sow/year	2.35	2.35		2.35		2.37	
Feed sow consumption (kg)	1140	1000	-140	1250	+110	1090	-50
Feed sow price (€)	0.26	0.26		0.26		0.26	
Sow feed (kg)/piglet	47	41	-6	51	+11	39	-8
Sow/year costs (€)	684	648	-36	713	+29	671	-13
Piglet costs (€)	28	26	-1.4	29	+1	24	-4

Table 1. The differences in piglet and sow cost based on varying levels of sow feed consumption and production results (SIP cost simulation).

Weight uniformity

In addition to using dam lines designed to be more feed efficient, another, often overlooked, factor in improving feed efficiency is weight uniformity. Increased uniformity makes fine tuning nutritional specifications for both performance and cost effectiveness easier for nutritionists.

Age and weight ranges and therefore nutritional requirements are narrower by phase so there is less under-formulation for lighter pigs or over-formulation for heavier pigs.

The more uniform the pigs, the more targeted and efficient the nutritional program can be. On top of that, there are management practices that can help save feed and optimise production.

Solid sow performance

Improved productivity can also decrease sow feed cost per pig produced. Managing breeding efficiency, non-productive days, and sow longevity are essential.

Looking at sow longevity alone, one has to consider the waste associated with feeding a gilt to breeding age only to cull her prematurely or the higher maintenance feed cost associated with retaining high parity sows to fill gaps created by prematurely culled younger sows.

Feeding systems

When feeding by automated systems, both the supply line and trough must minimise feed wastage. And if gestation feed is dropped into a trough with a constant water level, it is critical that the water level is not so high as to allow the sows to easily push feed out of the trough.

Feed in aisles, under silos, in feeding circuits or in pits is wasteful and costly, so maintenance of feed troughs/dispensers should be an important routine.

Repairing or replacing damaged troughs can also be an excellent investment.

Ambient temperature

The temperature range for a gestating sow's thermal comfort ranges between 16°C/60.8°F and 26°C/78.8°F (Marco I. Collell). Below this range sows are likely to consume more feed without any productivity benefits; above this range the risk is that sow will consume less feed with negative impacts on productivity (repeats/loss of gestation).

Lactation feeding

There are numerous feeding curve recommendations but a common objective is to maximise the sow's feed intake during lactation. It is important to reach the maximum intake as soon as possible, even more so with short lactation periods.

Achieving high feed intake during lactation not only benefits litter weight and sow condition at weaning but also influences the sow's productivity during the next cycle.

The key to achieving maximum intake during lactation economically includes:

- Increasing feeding curve from day of farrowing.
- Keeping feed as fresh as possible, small regular amounts in the troughs results in both better intake and less waste.
- Keeping ambient temperature below 20°C/68°F.
- Providing wet feed increases intake.

Reducing the feed cost per sow and thus per weaned pig can have a significant impact on the bottom line. It starts with selecting balanced parent stock gilts designed for feed efficiency and continues with sound management, routine maintenance of feeding systems and it goes on. Fortunately this is one area where the more we do, the more reward we see.

Conclusion

With the global population and demand for food on the rise and land available for agricultural production shrinking, the sustainability and success of the pork industry will be dictated by how efficiently we can produce our product and how we maximise our capacity to produce.

Feed costs represent approximately 70% of the cost of production. Higher feed costs will force cheaper ingredients into the diet. In this rapidly developing new environment the challenge remains to breed pigs, both dam and sire lines that are the best at converting feed into food.

Eliminating waste, realising genetic potential at the commercial level and pushing the limits of genetic potential will require the absolute best from producers and suppliers alike. ■