Creep feeding – why do producers remain doubters?

Paul Hopkins

Many years ago, weaning age reduced from eight to six weeks and many were predicting disaster. Then, NOT feeding creep was unthinkable; without it both sow and piglets suffered and its value was self evident.

As weaning age diminished so did belief in the value of creep feeding. Today many producers pay 'lip service' to it, with a half-hearted approach and no high expectations.

Feed intake is so variable between litters, especially with weaning between 3-4 weeks of age that producers can be forgiven for being confused by what they experience.

However, this further emphasises the need for scientific experiments and with some satisfaction the latest creep feeding work by Dr Sulabo and colleagues at Kansas State University has confirmed and added to European results a decade ago.

Hopefully Sulabo's work will answer some sceptical comments I often encounter:

● Creep feeding doesn't work

Piglets eating creep before weaning grow faster after weaning. Improved performance comes from a combination of increased appetite and improved feed conversion efficiency which, alone, massively justifies creep feeding with a welcome payback. In addition, pre-weaning mortality recorded 3.4% less deaths before weaning for creep fed litters.

● My piglets don't seem to eat creep feed

In part this is true. Sulabo's work confirmed, when creep feed is offered, only 50% of the litter will typically eat it (feed contained a dye affecting faeces, identifying eaters and non-eaters). Who is eating? Not surprisingly the hungry piglets often on the less milky middle and back teats.

● When should I start feeding creep?

Sulabo showed that the later creep is introduced, the fewer piglets begin eating before weaning.

With creep offered from three days of age, 23% of those that eat had already started eating by day seven and 43% by day 14.

So by day 14 around half the pigs that will be eating by weaning were already eating – before most producers have even started feeding creep!

The lesson: if you want creep feeding to work then start earlier rather than later.

● My piglets prefer lower quality, lower cost creep diets

Sulabo went on to tackle a great myth of the British Pig Producer – 'my piglets prefer lower cost diets in farrowing'.

Again, when subjected to scientific experimentation there was a dramatic three-fold increase in the number of pigs eating when offered a complex diet in comparison to a simple diet as their creep feed.

Conclusion

In short, creep feeding works best when very small amounts of a high quality diet are offered from the first week of life.

Still not convinced? If the litter eats 2kg of a €1000 diet before weaning, that has cost just €2.

After weaning, worst case results show extra growth alone would be over 0.4kg/pig in the nursery. That's over a 2:1 payback ignoring any FCR improvement and reduction in mortality.

European research indicates bigger improvements with paybacks of over 5:1. So get those doubts out in the open, brush them down and expose them to some good science! ■

Embracing new technologies

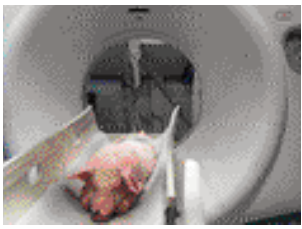
Dr Ian Wellock
European Technical Manager

Research and development (R&D) plays a pivotal role at Primary Diets. From our ongoing R&D programme we continually gain a fuller understanding of the piglet's nutritional requirements and the results, often tested in commercial situations, are used to make both nutritional and cost effective improvements to our complete range of diets.

Much of the R&D work carried out by ourselves and other similar nutrition companies, while being high quality and conducted at reputable independent universities to ensure accuracy of data collection, is fairly basic and routine in a scientific sense.

Often only feed intake and body weight are the major factors recorded in what we term 'feed 'em and weigh 'em' trials. Whilst this type of research isn't glamorous, it is a cost effective way of making progress in feeding piglets using established scientific methods.

Occasionally we identify a piece of research worth delving into a little deeper, requiring the use of up-to-date technologies and increased investment.



Anaesthetised piglet undergoing CT scanning

Primary Diets, along with sister company ABN and BBSRC, sponsor a PhD studentship at the University of Leeds investigating the consequences of weaner pig nutrition on lifetime performance and body composition. This project is using the latest technologies such as CT scanning which, as you may have read in the last issue, is a method commonly used by genetics companies to predict the carcase composition of live pigs to aid boar selection.

Although widely considered the gold standard, CT scanning is expensive and not very practical when large numbers of pigs are involved. Therefore cheaper and more practical methods for measuring body composition have also been investigated as part of the PhD study.

Bioelectrical impedance analysis (BIA) is a non-invasive, portable and relatively inexpensive method of measuring body composition and its use in the study of human body composition has accelerated over the past two decades.

In BIA, an alternating current is passed through the body and the resistance and capacitive reactance to that current is measured in order to determine body composition. As it is non-invasive it can be used repeatedly on the same animal making it ideally suited to measuring changes in body composition over time.

Data obtained by CT scanning has been compared with data obtained from the same pigs using BIA to validate the use of BIA as a method of measuring body composition. Results of the study show that body composition predicted by BIA matched closely that obtained by CT scanning and, more importantly, what the piglet eats in the nursery can indeed effect body composition in later life.

With this exciting and promising development in the use of BIA as a cheaper, quicker alternative for measuring body composition of the live pig throughout its life time, and the resulting nutritional opportunities it presents, we will be able to use it together with more traditional methods to secure even better value from our research budget and make continued progress in feeding piglets. ■

Measuring progress in R&D

Dr Ian Wellock
European Technical Manager

As mentioned previously, research and development (R&D) plays a pivotal role at Primary Diets. It is through our ongoing R&D programme that we aim to make cost effective nutritional changes to our diets which result in on farm improvements in both pig performance and profitability.

In order to determine whether our R&D programme has delivered improvements to our diets over the past 15 years since Primary Diets was formed, and if so by how much, we recently conducted a trial at the University of Leeds to evaluate the original 1996 diets versus the current 2011 diets.

The first thing which struck me when inputting the old 1996 formula onto our new formulation system was, while the diets have clearly evolved over the past 15 years, there were clear similarities. Diet formulae continue to be reliant on a number of milk based raw materials, cooked cereals and low temperature fishmeal.

This reflects the Primary Diets philosophy of improved fixed formulation, whereby step-by-step changes to formula are only made when significant improvements are found through our own R&D programme.

Both the1996 and 2011 diets were manufactured using current mill equipment and raw materials and fed to piglets at the University of Leeds alongside each other to ensure any difference in piglet performance was due to diet formula only. The first stage diet was fed from weaning until day seven and the second stage diet from day eight until day 20. It takes about six weeks from the start of a trial until we get the analysed data and I awaited the results of this trial more nervously than most others. Had all our hard work, not to mention considerable expenditure, paid off?

Thankfully, the results clearly demonstrated that compared to the 1996 diets, the 2011 diets have significantly improved pig performance and profitability.

An increase in average daily gain of over 50g/day (+18.9 %), resulting in an increase in piglet weight at 20 days post-weaning of approx 1kg had been achieved along with a 4.5% improvement in feed intake and a 12.5% improvement in feed conversion ratio (FCR).

Whilst often difficult to measure on farm, it is this significant improvement in FCR that has lead to an 11.6% decrease in cost per kg gain, and along with the improvement in growth, this has contributed to an increase in margin over feed (MOF) of nearly 300%.

It should be noted that this massive increase in MOF reflects the current low profitability in pig production and is equivalent to an increase in MOF of approx €0.88/pig at current prices.

Primary Diets research has continued to deliver over 1% improvement in daily gain and just under 1 % improvement in FCR each and every year since 1996 contributing an extra MOF of over €0.80 per pig at current prices! This is a result of small step-by-step changes to diet formulations and the occasional 'breakthrough' such as low phytate nutrition.

Let's hope the next 15 years deliver continued levels of improvement and much needed profitability to the European pig industry. ■

Compensatory growth: fact or fiction?

Paul Toplis

In the 40 years I have been calling on pig producers I have noticed an unlimited optimism in their belief that pigs will compensate or catch up for any loss in their early growth caused by feeding a 'cheaper' lower quality starter diet.

Compensatory or 'catch up' growth is a phenomenon where a pig accelerates its growth above normal levels after a period of suppressed growth.

Compensatory growth is attractive as it may offer several advantages, mainly lower overall feed costs – lower performance on a cheaper starter diet need no longer worry us because it will be cancelled out by compensatory growth on the lower cost per tonne grower/finisher diets and produce less nitrogen pollution.

So, with all this producer optimism and these apparent benefits, why isn't every producer using a 'compensatory growth' feeding programme? Let's look at the evidence.

Pig production is science driven and when looking at the scientific literature there is conflicting evidence regarding the issue of compensatory growth.

There are at least 23 scientific papers on compensatory growth that are relevant to what we do in commercial production. Of these 23 published papers, five show no sign of compensation, three are inconclusive, eight show partial compensation (some of the growth lost during the period of suboptimal feeding is regained by slaughter) and only seven show full compensation.

So, compensation may exist but highly variable results are achieved. Furthermore, in many of the trials where compensatory growth appears to be achieved there is some question as to whether the catch up gain is associated with lean meat, fat or gut fill.

What commercial decisions can be driven from results like these? Well it is clear that with today's level of understanding there is no certainty of compensatory growth and so adopting a feeding programme to exploit compensatory growth is a 'gamble'.

Looking at the risk:benefit ratio there is a 30% chance of it working, a 22% chance of it failing and a 48% chance of it 'partially' working. When we dig deeper into the science we see many variables that may influence the likelihood of observing compensatory growth; sex, genotype, length and severity of restriction and timing. We are struggling to see the 'wood for the trees' at the scientific level so believe producers have little chance of exploiting it at farm level without taking what would appear to be an inappropriate risk.

These scientific studies also show us that some risks are greater than others. One of the factors most strongly associated with a failure to compensate was early restriction. Feeding a lower quality starter diet post-weaning will most likely result in the failure to compensate and increase overall feed costs through an increase in days to slaughter.

So, after 40 years I am willing to concede there is some foundation in the pig producer's optimism around compensatory growth, but more work is necessary before science unravels enough of the complex factors to allow compensatory growth feed programmes to be commercially exploited. ■

The Primary Word on Piglet Nutrition

It's not just the formulation

Philip Stockill
General Manager, Primary Diets

As starter diets are perceived to be 'expensive', many companies are often challenged as customers believe they should either be able to manufacture it themselves or have starter diets manufactured at a standard compound feed mill.

There are many reasons why buying from a specialist manufacturer is crucial to getting the most advantageous start for piglets and the decision to source from non-specialist suppliers could significantly impact on the lifetime growth of the pig.

Trust the specialists

Among the reasons to trust the specialists is the significant investment these companies make in R&D, the carefully formulated diets for each stage of the piglet's life and the large number of specialist, human grade quality raw materials required to meet the nutritional needs of the piglet.

However, manufacturing the product correctly with the correct equipment is also critical.

Apart from very specialist appetite enhancers, the vast majority of post-weaning diets are pelleted.

Pelleting piglet diets improves daily gain and FCR by around 20% in the week following weaning, falling to around 5% thereafter.

To manufacture a good quality pellet, the 'meal' needs to be heated or conditioned – a process where steam is blended into the meal to provide a mixture that will pass through the pellet press without blocking it.

In a standard feed mill, the conditioning process is carried out at 80ºC to optimise throughput and efficiency.

However, in a specialised piglet starter feed mill it is critical not to heat the meal to 80ºC as this damages the high quality milk proteins.

Overheating leads to caramelisation of the milk which means a reduction in digestibility of the feed and reduced piglet performance.

Whilst pellet length can usually be accommodated at both standard and specialised manufacturing facilities, a trial conducted by Primary Diets at the University of Leeds (Table 1) demonstrated shorter pellets do not actually improve piglet performance and instead smaller pellets just increase the risk of fines or dust.

	Long pellets (Average 9.7mm)	Short pellets (Average 4.9mm)
Feed intake (g/d)	322	334
Average daily gain (g/d)	305	297
FCR	1.06	1.13

Table 1 . The effect of pellet length on piglet performance from weaning to day 20.

Summary

So, in summary, a starter feed programme where piglets have the optimum start in life requires the production of feed from a specialist manufacturing process involving the use of particular equipment and high quality raw materials in the correct formulation.

Certainly as a specialist producer ourselves, we are more than willing and able to prove a significant return on investment. ■

The Primary Word on Piglet Nutrition

Choosing the right feeding regime for your unit

Dr Ian Wellock
European Technical Manager

Choosing the right feeding regime in the nursery is critical; if you get it wrong there is no opportunity to correct it with the next diet.

In order to choose the best feeding regime for your unit it is important to balance the economic value of performance against the cost to achieve this level of performance. There are different measures to judge a diet or feeding programme, such as intake, gain, FCR, cost/kg gain etc, but Margin Over Feed (MOF) is probably the most useful.

This is calculated from the value of the weight gain in the nursery phase, less the feed cost associated with this gain.

In loss making times as well as profitable ones, MOF should be given the greatest importance when assessing which starter regime to use, as this is the measure which will have the biggest impact on the bottom line.

For producers, your pigs will assist you in determining the most appropriate starter regime for your unit, so run a trial and let your own pigs tell you which diets work best.

To make a fair comparison between dietary regimes it is important to carry out a controlled side-by-side trial.

This involves testing all regimes during the same period of time, ideally using a comparison between pens in the same room where the only difference between pens of pigs is the diet they are receiving. In an ideal world there should be multiple pens per diet regime, in the same air space and balanced as far as possible for number, sex and weaning weight.

The more pens there are on trial, the more confident we can be that any observed differences in pig performance are due to dietary treatment.

On some units side-by-side trials are not always practical for management reasons, such as those that house pigs in large, single groups. In these situations the only sensible option is to run a full batch of pigs on one regime followed by a full batch on another.

However, a word of caution; this method increases the chance that any performance differences observed between batches of pigs may be due to factors other than dietary treatment that may change over time, such as disease challenge passing through the unit.

This is even more pronounced on outdoor units where environmental factors, which may have a big effect on performance, are constantly changing.

If you have no option but to run a trial in this way, then multiple batches of pigs on each dietary regime should be tested, ideally alternate batches on each regime, to help overcome any differences.

There are really only three things that need to be recorded in farm trials. Firstly, the number of pigs per pen both weaned onto the trial and at the end.

It is also useful to record any pigs removed from the trial and the dates that they were removed. The second measurement is the weight of the pigs in and out of each pen on trial.

Pigs do not need to be weighed individually and pen weight is usually sufficient, although having individual data allows variation in piglet weights to be assessed and considered.

The final key factor is the amount of each diet consumed over the duration of the trial and this should take into account any food remaining in the troughs at the end of the trial.

From these measurements weight gain, feed intake and FCR can be calculated and used in order to carry out a cost benefit analysis of each regime including cost per kg gain and of course MOF. ■

An innovative new creep product

Dr Ian Wellock
European Technical Manager

We have previously discussed the importance of feeding a high quality specialist creep feed pre-weaning and the benefits it brings.

These include a decrease in pre-weaning mortality, an increase in weaning weight and improved transition to solid feed at weaning, all of which result in improved post-weaning intake and performance.

Exciting data

To reinforce these points I would like to share some exciting data from a series of university and commercial trials on our new high lactose pelleted creep feed, Initiate 4.

Phase 1 trials (February 2011) on four commercial farms compared a standard Primary Diets creep regime with Initiate 4, fed in the farrowing house from four days of age.

Results showed a pre-weaning benefit in three of the four farm trials, giving an average +5.5kg/litter weaning weight, resulting from an extra +0.4 pigs/ litter weaned and +300g/pig weaning weight (Table 1).

Phase 2 of the trial work was carried out at two independent university sites to determine whether pigs fed Initiate 4 pre-weaning continued to perform better post-weaning.

Once again, Initiate 4 was trialled against another standard Primary creep feed product, both fed from day four, and then all piglets were offered exactly the same diet post-weaning.

	Standard creep regime	Initiate 4	Pre-weaning benefit of Initiate 4
Number of litters	106	105	-
Litter size at start of trial	10.7	10.7	-
Litter size at weaning	9.5	9.9	+0.4
Mortality (%)	11.2	7.3	-3.9
Litter weight at weaning (kg)	71.2	76.7	+5.5
Piglet weight at weaning (kg)	7.6	7.9	+0.3
Creep intake per litter (kg)	2.0	2.5	+0.5

Table 1. Average pre-weaning benefit of Initiate 4 from four commercial farms and two independent university sites.

Any performance differences, therefore, would be a direct result of the differing pre-weaning feed regime.

Across the two trials piglets offered Initiate 4 pre-weaning were on average +780g heavier at 21 days post-weaning as shown in Table 2.

These pre and post-weaning benefits are seen with only a relatively modest increase in feed intake of only an extra 50g/ piglet.

Introducing creep feed to piglets from day four of age and following good practice of offering creep little and often results in more piglets within each litter having eaten solid feed by weaning.

This is a factor known to ease the transition to solid feed and reduce the post-weaning growth check.

The combined benefits of earlier acceptance of solid feed, increased pre-weaning intake and improved gut development and integrity is the likely driver for not only improved pig weaning weight, but also the dramatically increased nursery exit weight.

Commitment to research

At the heart of Primary Diets is our commitment to research and feed development to optimise pig performance and help producers remain as competitive and profitable as possible.

Whilst feeding a creep feed from day four of age may not be a normal concept, the feedback we are getting from customers, in addition to the trial results, is that our latest results are proving highly cost effective across a wide range of units. ■

Table 2. Post-weaning benefit when Initiate 4 is offered pre-weaning from four days of age at two independent university sites.

	University 1		University 2		Post-weaning
Pre-weaning diet	Std creep	Initiate 4	Std creep	Initiate 4	benefit of Initiate 4
Weaning weight (kg) (d 0)	9.42	9.36	7.64	7.66	-0.02
ADFI (g/day)	381^{a}	418^{b}	358^{a}	381^{b}	+30
ADG (g/day)	296^{a}	344^{b}	309^{a}	339^{b}	+39
FCR	1.29^{a}	1.22^{b}	1.16	1.12	-0.06
End weight (kg) (d 21)	15.92^{a}	16.92^{b}	13.87^{x}	14.43^{y}	+0.78

Significant differences between creep regime at each university are denoted by different superscript letters (a vs. b for P<0.05; x vs. y for P<0.1)

The Primary Word on Piglet Nutrition

If they don't drink, they won't eat!

Dr Ian Wellock
European Technical Manager

Like other key nutrients, such as energy, protein, vitamins and minerals, water is essential to the pig.

Water assumes even greater importance given the pig can survive much longer when deprived of food than it can without water, probably explained by the fact that water makes up the majority of the pig; approximately 80% of the newborn piglet declining to around 52% at market weight due to the lower water content of fat compared to muscle.

Importantly, water intake also has a direct affect on daily feed intake which in turn affects gain and of course profitability. If piglets don't drink, they won't eat!

It is worth therefore spending a few minutes to consider if we are watering our piglets correctly and I have listed below six points for consideration:

1. Water should always be available to piglets pre-weaning, preferably with the same drinker types as being used post-weaning. Although water intake will be minimal during this period, it will help to encourage the piglets to learn new skills required in the nursery.

2. The piglet's water requirement is related to feed intake (and daily gain) and is usually around 2-3 times the feed intake. Around 0.6-0.8 litres a day is a good guide for piglets post-weaning, although newly weaned pigs often drink excessively (around 1 litre a day) for the first two days after weaning as a response to hunger and before efficient feeding is established.

3. Water usage increases with rising temperatures and to help piglets deal with certain health problems such as diarrhoea. Diets containing excessive protein and/or excessive minerals will also result in increased water usage. Conversely, water intake will be reduced by warm water, high levels of salinity in the water and when pigs are cold.

4. Optimal flow rate for newly weaned pigs, through a nipple/bite drinker, is around 700ml/min. This should be increased as pigs get older to 1 litre/min. Flow rate should be checked in the furthest drinker from the header tank when all drinkers are in use. Piglets are lazy and will not extend drinking time to compensate for low water pressure; typically spending around 20 minutes of daylight hours drinking.

5. There should be at least two drinkers per pen, and although different drinker types and delivery rates control the number required, we should target one drinker per ten pigs. With troughs, the recommendation is no more than 20 pigs per foot of trough space. Additional drinkers for the first week post-weaning are strongly recommended to get the pigs drinking. Turkey drinkers and troughs are especially useful in this period as they are highly visible and piglets take quickly to open water.

6. Drinkers need to be at the correct height position. Nipples should be at shoulder height of the piglet not inches above head height as is commonly observed. Remember both big and small pigs are likely to be in the same pen and all pigs will be getting bigger during their stay in the nursery, therefore height adjustable drinkers or drinkers at multiple heights are important to satisfy the requirement of all pigs for the duration.

I have mentioned the need for a correct water delivery system and some points for consideration on how to supply piglets with water. We must also not forget water quality, another often overlooked area, but that's for another day. ■