The Neonate

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

What is not too clear on most farms, and it is not often measured, is that the starting point for production excellence is birth weight.

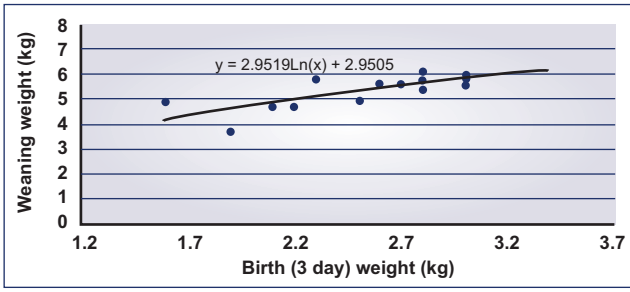
There are strong and robust relationships between birth weight, post natal growth and the weaning weight itself and hence any management directed at improving birth weights and immediate post natal growth will have a positive impact on weaning weights and, as a direct consequence, growth to slaughter. The immediate things that spring to mind that determine birth weights are gestating feed quality and quantity for the sows – and especially in the last third of pregnancy when foetal growth is at its peak.

Sow body condition also plays a definite role and of course health status. It is also a fact that there is an inverse relationship between litter size and birth weight and this highlights a modern problem that we are faced with as litter size increases and hyperprolificacy programmes have given us far more piglets per litter than was normal in the past.
Assuming that we have generated piglets at birth with an average weight of 1.3kg then, although this should set up the litter potentially to be 8.5kg at 28 days of age, we must also nurture this neonatal piglet to achieve this potential. It is also a fact that on-farm neonatal mortality levels are still running at around 11%, which is a significant waste of potential prime pork.

Of this 11% a large slice is from infections and overlying and also starvation problems after birth. As prolificacy has increased, there has also been an associated rise in stillbirth rates and 1.5 stillbirths per litter is not unusual.

Colostrum management and supply is also a large determinant of ultimate weaning weight and there are some well researched products available in this area to use on farms to supplement immunity and post-natal growth.
Figure 1 illustrates from a sample of previous data from SCA's Green Hill Farm unit how birth weight impacts on weaning weight. Every time we add on 200g to birth weight we add another 0.4kg on to the ultimate weaning weight and this reduces the time to slaughter by about five days.

Figure 1. The impact of birth weight on weaning weight.



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Increasing sow productivity

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

Prolificacy and fecundity in modern hybrid sows have both increased significantly in recent years and this offers a cost reduction bonus for most industries around the world. Sell more pigs per sow and you spread your fixed costs over more pigs and the overall unit cost per kg of pig produced falls considerably.

The starting point in this is to make sure that there is a maximum of piglets born alive per litter and the good work by the hybrid genetics companies in hyper-prolificacy and incorporation of prolific genes has really made a difference in recent years.

There is, however, no point in producing 14 piglets per litter if two die in the birth process itself and three more die immediately after birth due to a prolonged and difficult parturition. The evidence suggests that as litter size goes up the rate of stillbirths per litter rises and also the incidence of neonatal deaths too.

The problem is that with such large litters, the sow literally becomes fatigued towards the end of the time it takes to deliver a large litter. In effect, therefore, the last piglets delivered down the birth canal suffocate before they have the chance to breathe normally after birth. The last 2-4 piglets born are always compromised in terms of survival prospects.

The solution to this is to give each sow as she is about to begin the process of parturition, an oral supplement that contains an energy booster to ensure those last born piglets get out quickly.

Parturaid, therefore, from SCA NuTec and sister companies within the Provimi group around the world has been designed to tackle this problem. The product was innovated by the Provimi Research & Technology Group and formulated and manufactured in the UK by SCA Nutec. A single oral dose (30ml) of Parturaid is given to each sow in the immediate time before farrowing.

Increase in numbers born alive	0.78
Litters/sow/year	2.2
Extra pigs per sow per year	1.72
Number of sows on farm	800
Total number of extra pigs sold	1373
Value of each pig	€28
Increased revenue	€38,438
Increased annual profit	€35,974

Table 1. Parturaid results From Europe.

The benefits stemming from the new unique product is the prevention of a large proportion of those stillborn piglets.

Parturaid, therefore, is a totally new and unique method for enhancing sow productivity. The cost benefit ratio associated with its application is very high indeed and whatever global currency we calculate this in, we still make a very positive impact on the financial margin for the farm.

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Towards one tonne of piglets/sow/year

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

Annual sow productivity is still a major factor that determines the overall level of both physical and financial performance for a pig producing business. This has continued to rise over the last 25 years with earlier weaning, better reproductive management and improved techniques of nutrition.

It is also clear that there is no point in producing 30 piglets born alive per sow per year if only 20 make it to weaning alive. Pre-weaning mortality is still running at levels that are too high and most units do not see figures below 10%. The other aspect of mortality is also various categories of intra-partum deaths occurring both before, during and immediately after farrowing. Stillbirth deaths and neonatal deaths also account for a significant proportion of overall mortality and hence reduced annual sow productivity.

Modern hybrid sows are also very prolific in terms of their ability to ovulate and show reasonably good embryo survival rates.

placental oxygen supply and are delivered quickly and will breathe normally. Those foetuses at the ovarian end of the long uterine horns (maybe 3m long) have to wait their turn until the end of the process – maybe 4-6 hours, during which time the oxygen supply via the placenta is steadily shutting down. The upshot is that the last born piglets have only a 50% chance of surviving and at best will be hypoxic and brain damaged and at worst will be anoxic and die of suffocation before delivery.

If, therefore, we can provide the sow with the means to exhibit a faster overall farrowing time, then we have a chance to significantly reduce stillbirths. Parturaid has been designed and tested with this in mind. This is an oral paste that contains a whole complex of energy factors plus vitamin and mineral factors that working together achieve this goal. Given as a 30ml oral dose within 0-8 hours prior to farrowing, speeds up the whole farrowing process and brings

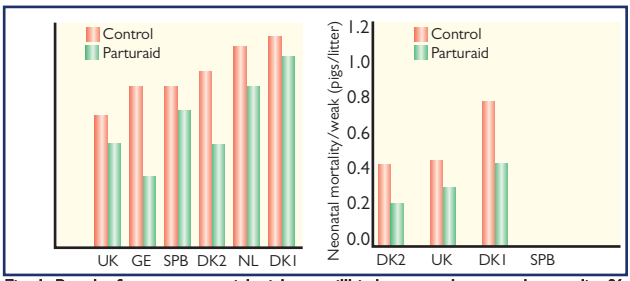

Fig. 1. Results from commercial trials on stillbirth rate and neonatal mortality %.

The whole process of parturition 'normally' takes between 2-4 hours but the variation in this is enormous in biological terms. Once parturition is initiated under hormonal control (endogenous or exogenous) the uterine contractions begin and each foetus gradually makes its way via the cervix to the vagina and is ultimately expelled. This is fine for those pigs located within the uterus near to the cervix. They are dependent on

down the stillbirth rate.

The results have shown that farrowing time is reduced from around 170 minutes to about 110 minutes and this 60 minute saving is just right in order to get those last born piglets out alive.

On average, this means about one piglet extra born alive and about 2.5 piglets extra to sell from every sow every year.

Fig. 1 shows the results from the first trials in Europe. Clearly, all data followed the same course and Parturaid gave consistent improvements in both parameters. ■

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Handle the heat

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

Here we are at the time of writing in the middle of April and the UK is seeing daytime temperatures of 25°C. If the summer continues like last year then we may be in for a blistering summer with near 40°C temperatures in July and August.

Those parts of the world where these sort of temperatures are the norm and where humidity is high too have specially designed pig building systems. Here in northern Europe we are not geared up with our buildings or our management to handle extreme temperatures.

While the modern environmental control systems in the UK are designed to cope with a range in conditions, most nursery buildings struggle when outside temperatures are more than 28°C.

When it reaches these temperatures, intakes will typically fall in the post-weaned piglet and this can be a very precipitous fall indeed. If the piglet eats less it generates a lot less heat from the processes of digestion and absorption of nutrients and it will feel a lot more comfortable.

Figure 1 gives a summary of temperature effects on intake from INRA work in France and shows what the likely fall in voluntary feed intake (VFI) will be as temperature rises from 10°C to 40°C for both a pig between 10 and 30kg and for a pig 30 to 100kg. Clearly this is a significant effect and intake will be affected for all pigs right through to slaughter weights.

However sophisticated the temperature control system, there are some pointers that will help protect intakes and growth rates.

Firstly, it is good management practise to anticipate sudden 'heat wave' conditions.

From a nutritional standpoint, we can ensure that all feeds are as highly digestible as possible and this usually maximises palatability because of the raw materials that are used to achieve this.

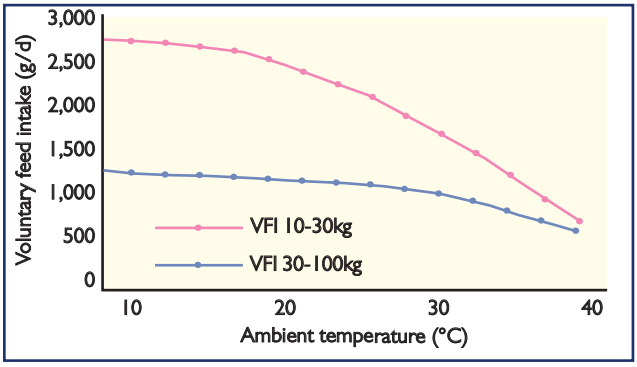

Figure 1. Temperature effects on voluntary feed intake.

If overall feed intake falls, as in Figure 1, then the more nutrients that are packed in to every kg of feed the more this effect will be offset. The nutritionist can also review the level of protective antioxidants in the feed because these have been shown to be 'heat stress' protective to young growing pigs.

The other bullet that may have to be bitten at some point is a review of the stocking rates within a given building. Lower numbers of pigs will generate less heat and subsequent problems will be reduced.

It is clear that piglets will respond to excessive heat by reducing intakes – a situation that producers are keen to avoid and one where improved nutrition can play a valuable part. ■

Wasting disease control

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

While European pig producers have learned to manage the effects of wasting disease, colleagues in the USA are being hit hard by the most virulent strain of PMWS (PCV-2), or what the Americans are calling porcine circovirus disease.

Most European pig industries now follow husbandry guidelines laid down by the French that have proved valuable in managing the disease, and the PCV-2 strain that arrived in Europe about five years ago.

These guidelines include later weaning, all-in-all-out practices, smaller group sizes, reduced social mixing and high levels of biosecurity.

However, for pig producers in Europe or the USA, there is no room for complacency and we need to keep abreast of current research.

For this reason, Dr Gordon Allan's paper at this spring's British Pig Veterinary Society meeting in Dublin was very well received.

Dr Allan, from Queen's University Belfast, is co-ordinating a £4 million pan European project on PMWS and PCV-2.

He drew particular attention to both sow and piglet nutrition and to nutritional programmes to offset the disease.

This starts with a supply of high quality (immunoglobulin concentration) colostrum and the importance of the passive protection conferred by the sow to piglets because of its long lasting effects – giving gut and systemic protection over ensuing weeks. Sow feeding programmes to achieve this are hence extremely important.

Also, Dr Allen supported one of our key messages here at SCA NuTec – that nutrition must boost the immune system of the piglet and post-weaning growth must be as good as it possibly can be.

A fast growing piglet has a better immune status and, therefore, is more resistant to diseases, including PCV-2 infections.

Gut health status, in terms of villus integrity, is also important here and a high quality post-weaning programme with appropriate ingredients will cause less 'nutritional stress' to the animal.

Dr Allan also showed some recent data from his project where an immuno-potentiating package of essential oils and triglycerides was given to post-weaned piglets and this had beneficial effects on the growth performance of the piglets in a challenged environment.

The new PCV-2 vaccines are also going to give us the extra tool to minimise mortality rates even further. These have been a long time coming and are still under test – but the results to date look very promising.

European pig industries have made the right changes in their farms to overcome the disease via these various routes. From our knowledge of PMWS and from the meeting it is clear that we are not dealing with a simple disease syndrome and we need complex control measures in place. ■

Essential oils grow in importance

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

The concept of essential elements applies to animal nutrition just as it does to plants. Nitrogen, potassium and phosphorus are essential elements in plant growth. In animals we have essential amino acids, where these specific protein fragments are essential for growth and health.

Essential oils

Another group of 'essential' compounds are increasingly being recognised as useful in animal nutrition. These essential oils are the natural plant defence molecules that plant species have evolved to defend themselves against bacterial challenge.

They are called 'essential' because they were originally used, and still are, in the perfume industry and many of them are volatile and have distinct odours.

Essential oils have an important role in animal nutrition as a means of controlling bacterial growth on the gut wall. Some of them, but not all, are very powerful anti-microbials and hence when they are used in the right way can offer some of the properties we need – particularly for young growing pigs.

Extensive research on their properties and improving their usefulness is proving beneficial. SCA NuTec and its parent company Provimi have spent the past eight years and invested heavily in this area.

Variability of oils

The main problem to overcome has been the variability of the oils in plant extracts and the difficulty of measuring them in chemical analysis. This has made it difficult to predict animal responses.

Furthermore, because of their volatility and instability as chemical entities, they have proved difficult to incorporate into animal feedstuffs.

Provimi and SCA NuTec have screened the most useful molecules to show animal efficacy. Techniques have also been developed to fix and stabilise the molecules when used in premixes or complete animal feedstuffs.

As a result, they can now be incorporated into feed products with appropriate quality control data and the animal response, when used at parts per million levels in a feedstuff, can be accurately predicted.

Proven products

Products for young weaned piglets – like SCA NuTec's Tranzone or Provimi's Cinergy – now have a wealth of laboratory data and animal trial data to give confidence to end users.

SCA Tranzone is a proven and reliable alternative to feeding regimes that have previously used antibiotic growth promoters.

This nutritional package, that includes purpose designed acidulants and essential oils, can be included in SCA piglet diets, premixes and concentrates.

In trials, piglets fed rations including SCA Tranzone progressed more smoothly through weaning and maintained higher feed intakes in order to reach a slaughter weight of 95kg a predicated 10 days earlier compared with those fed on conventional feeding systems.

These essential oil products have been on the global market for about five years now and developments are still going on to look for more opportunities.

In the early days there was much mystery attached to this developing science but the scene is very different now.

Nature identical molecules involved with known characteristics can be used with knock on benefits to piglet and grower pig performance. ■

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Appetite equals intake

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

If pigs do not eat they do not grow. Even with a high gut health status and good environmental conditions, if the rate of daily feed intake is low then growth rates will be low. They must have the appetite to want to eat.

The most acute time for feed intake in very young piglets is just after weaning. The transition from sow milk to a total dependence on a dry feedstuff can be a major mountain to climb for a 21 day old piglet at 6kg liveweight.

Even a 28 day old piglet weaned at 8kg can find this quite an ordeal. And a set back here can last a lifetime – piglets are not too good at playing catch-up.

Producers therefore need to use every nutritional trick to maintain and enhance appetite at this crucial time.

Firstly, an effective creep feeding programme should be used to achieve at least 500-600g per piglet eaten before weaning.

This not only adds valuable weight at weaning but also promotes the development of the enzyme system and the mucosal immune system for later gut protection and nutritional functions.

Creep feeding also provides the piglet with the important feeding behaviour cues that will encourage piglets to investigate and then eat a dry feed.

Secondly, the design of the post-weaning feed programme itself is pivotal to success. Highly digestible ingredients and the correct raw materials are paramount.

Fish meals for example can contain a high proportion of so-called bio-amines that have deleterious effects on feed intake for sensitive post-weaned piglets.

So the right specifications and the right selection of products in a multi-phase feeding programme will keep feed intake moving on upwards after weaning and achieve the growth targets.

Specific appetisers are also of great value in the immediate post-weaning phase. Lack of intake and growth for between two and six days after weaning is a typical growth check syndrome seen on most farms.

Therefore, a powder top-dressing that has been specifically formulated to be highly attractive and palatable to young piglets is a useful tool in this phase.

Mixed with the regular pre-starter feed both before weaning and them immediately after weaning for four to seven days will promote feed intake and keep growth up and running.

The advantages of this on gut lining, villous integrity and therefore gut health cannot be overstated.

SCA NuTec produced the first appetiser product of this kind about 20 years ago and SCA PrimiStart is still widely used today.

Its positive effects on appetite have been validated in extensive commercial trials over the years and it certainly plays a part in keeping performance at a high level on many units. ■

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Neonatal survival pack

by Dr Mike Varley, Research & Technical Manager, SCA NuTec.

In an ideal world, an average sized litter of strong healthy piglets will follow nature's course and thrive. But so often this is not the case. Larger litters and a range of piglet weights present challenges, and wastage of newborn piglets is still a major problem for swine producers.

However, there are management protocols and nutritional aids that can offer a 'survival pack' for the newborn and these will contribute to increasing the all-important annual sow productivity.

Prenatal losses, or those incurred at and around the time of parturition, are a source of significant economic losses in modern pig production. In a typical litter of 12.2 piglets, 0.9 are stillborn and 1.5 piglets die pre-weaning.

Farrowing is a physically challenging process for the sow and as litter size has increased, this is even more relevant. She can tire easily and exhaustion can result in birthing problems leading to stillbirths and neonatal mortality. These losses can be aggravated by large litter sizes, poor physical condition of sows and poor housing conditions.

Giving the sow the energy rich micronutrient paste Parturaid as she starts parturition can help improve piglet survival and overall sow productivity. Trials have shown that it can reduce stillbirths from around 1.2 per litter to 0.5. This in itself means another 1.6 piglets extra to sell per sow per year for little extra cost. This product also reduces neonatal deaths by around 0.3 piglets per litter.

There is no simple solution to the neonatal mortality problem.

In nature it comes down to survival of the fittest. Pig producers are tying to counter this and provide the care that enables 'survival of all'. Piglets are born into a cold, harsh, competitive environment straight from the protected and nurturing environment in the womb. At birth they have limited energy reserves of just 1% body lipid and finite glycogen stores in the liver. Nature attracts them therefore to the sow's warm udder as they follow the thermokline (temperature gradient).

Each piglet will then locate and take ownership of a specific teat and normal suckling behaviour will ensue. This gets them off the hook regarding basic survival and they will be on the road to growth.

But there are a few possible pitfalls. In the chaos created by maybe 12 piglets all competing for teat ownership, and taking into account the size differential between sow and piglet (250kg:1.3kg) there will be casualties.

The weaker less vigorous piglets will always be the ones that will be prevented from taking a teat and will be much more likely to be crushed by the sow – they just do not have the energy and vitality to escape the sow's inevitable movements.

Deaths in the first three days of life are therefore predominantly in this category. Even though final cause may be starvation, disease or crushing, they all follow a similar course.

Parturaid can also play a part in reducing neonatal deaths as it will pass across the placenta into the foetuses and provide a vitality boost to the piglets immediately after birth. It makes them just a bit quicker on their feet, resulting in improved survival prospects.

Where there is an above average incidence of neonatal deaths a colostrum supplement such as SCA Kiss Of Life can provide extra energy straight into the piglet to help it on the road to survival.

Taking advantage of these nutritional tools and employing the very best standards of management, building hygiene and stockmanship are paramount in the quest to reduce pre weaning deaths and increase sow productivity in terms of piglets sold per sow per year – the main goal for producers. ■

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