Feeding and Nutrition of Pre and Post Weaned Piglets: A Modern Approach

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MENU

- Consumer Demands & Operational Landscape
- Animal Health
- Feed Intake
- The Global Pig Industry
Benefits of Creep Feeding

- Improved weaning weights (less PMWS)
- Less body condition loss for the sow
- A smoother transition after weaning
- Potentially better health status
- Gut health after weaning improved
- Less days to bacon overall
- More consistent litters
- Enzymes and Immunology - better development before weaning
The Sow’s Milk Production

![Graph showing milk production over age (days).](image-url)
Creep intake and weaning weight

\[ R^2 = 14\% \]

Green Hill Farm
The pig is an amazing species!!

- Doubles its birth weight in 7 days
- Grows to 100 kg in 140 days
- FCR is about 2.3
- 30 piglets per sow per year
- Only 20% of environmental impact compared to beef and sheep meat
- Can utilise co-products well
- Consumers find new production systems totally acceptable
- Food safety standards can be high
- In the UK price in the shops pork is 30% of the price of beef
- Very convenient meat for new young consumers
The Operating Landscape

- Consumers have been vociferous on welfare for about 25 years in the UK and Northern Europe.
- Consumer research has always indicated that at the point of purchase they ignore the ‘lip service’ on welfare.
- It is however a major driver for home produced pork purchase.
- Producers now realise that welfare is a major ‘differentiator’ for UK Pork against competition from Continental Europe (Denmark and Netherlands etc).
The Operating Landscape

- UK Pork commands a premium differential price of around 30 p per kg deadweight compared to the rest of EU industries.
- Our supermarket multiple retailers are well aware of this and sell hard on this fact for local UK produce.
- When imports from Europe really get cheap the retailers have a propensity to express more labelling mistakes !! (isotope analysis can stop this).
- Welfare and its commercial importance is therefore understood by all sectors of the pork supply chain.
The Operating Landscape

- Weaning age is now higher – 28 days
- AGPs are restricted in use
- Principles of gut health understood
- Buildings for weaners are now a high standard
- AIAO, Batching, Hygiene and Health are improved
- Nutrition is much improved
- Weaning weights are now much bigger
Outdoor Pig Production – Yorkshire England 40% of total production
Large Scale Pig Production
Australia

27,000 sows – one site – 5 modules
Ingredient Selection is a Key Factor
Milk Proteins are a Key Ingredient in Cheese and Butter/milk Production. Here are the main ingredients:

**Cheese**
- Whey powder
- Delactosed whey powder

**Butter/milk**
- Casein
- Skim milk
From Birth to Bacon

Size Matters!

Green Hill Farm
Starter feed use is a small proportion of overall feed inputs

But – determines 30% of the variation in growth to slaughter
There is no Compensatory Growth in Pigs

Slaughter
Which Weaner Is The Most Profitable ???

<table>
<thead>
<tr>
<th>Weaning Weight</th>
<th>6 kg</th>
<th>7 kg</th>
<th>8 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Weaning Gain</td>
<td>250 g/d</td>
<td>350 g/d</td>
<td>450 g/d</td>
</tr>
<tr>
<td>70 day weight</td>
<td>26 kg</td>
<td>29 kg</td>
<td>32 kg</td>
</tr>
<tr>
<td>Slaughter Age</td>
<td>160 days</td>
<td>150 days</td>
<td>140 days</td>
</tr>
</tbody>
</table>
Gut Health

- Piglets are weaned at an immature stage
- They have poor enzyme development
- They have poor immunological development
- They will get diarrhoea and die if the nutrition is wrong
- They have poor dry feed intake characteristics
(Representative Sections of Gastrointestinal Tract)

- Esophagus
- Stomach
- Small intestine
- Large intestine

- Longitudinal muscle
- Circular muscle
- Gland in submucosa
- Muscularis mucosae
- Lamina propria
- Epithelium
- Villus
- Lumen

- Myenteric plexus (plexus of Auerbach)
- Lymphatic nodule
- Mucosal plexus (plexus of Meissner)
- Gland in submucosa
- Glands in mucosa
- Mesentery

MUCOSA
- SUBMUCOSA
- MUSCULARIS
- SEROSA
Weaning effects on villi

Less Gut Damage After Weaning

Before Weaning

After Weaning
Weaning with improved nutrition

Less Gut Damage After Weaning

Before Weaning
The Health Status Continuum

- Immune System Firing
- Net Energy Diversion (6%)
- Food Intake Compromise
- Morbidity
- Poor health
- Average Health Status
- Maximum Protein Utilisation
- High Health
- Feed Intake Maximised
- Full Genetic Potential Lean Growth
- Death
The Development of the Gut Microbiota

Birth

Microbial Consortia

Seeding the Gut Maternal/Environmental Origin

Adult

Lactobacteria

Streptococci

Enterobacteria

Obligate anaerobes

Birth and Adult microbial consortia are shown, with different bacterial species indicated. Lactobacteria, Streptococci, and Enterobacteria are mentioned, with an emphasis on their maternal/environmental origin.
Managing The Microflora !!

BUGS OUT !!
- Gut Health
- Feed Hygiene
- Acid Status
- Immune Status

Gut Bugs

HOUSE MICROFLORA
- House Hygiene, Pen Throughput, Cleaning Protocols, Batch Size, Stocking Density, Batch Number

BUGS IN !!
- Environment
- Feed Hygiene
- Feed Quality
- Other Pigs
- Stocking Density
- Acid Status
Feed Intake

- A principal key to success
- Interacts with Gut Health
- If they don’t eat they don’t grow !!
Food Intake Regulation Is Poorly Understood in Most Species!!
Feed intake is a key to gut health

Change in Villus Height (%)

Gross Energy Intake (MJ/d)

Pluske 1996
Many Factors Affect Voluntary Feed intake

Age
Nutrient Density
Weight
Stress
Stocking Density
Water intake
Genetics
Grouping
Temperature
Ingredient Quality
Disease Status
Nutrient Balance
Individual daily piglet feed intakes – week 1 after weaning

Bristol University Vet School Miller et al 2002
Manufacturing

- Pellet press manufacture
- Fixed formulations
- Temperature / Pressure / Micronisation
- Throughput / Extrusion – Micronisation
- Dedicated mill facility
- Raw materials
- Blending
- Cross contamination
Processing Cereals Improves Pig Growth

Day 1-10 (Startrite 90)

DLWG (g)

Processed

Raw

Green Hill Farm 1998
We must understand Feeding Regimes!
Effect of DE (conc.) on Voluntary Energy Intake Model (based on INRA & Australian data (Campbell et al)

Figure 5. Effect of dietary energy concentration on voluntary energy intake in weaned piglets
Villus protection will still be needed

Mucosal Immunity

Protection Methods

- Change Acidity (pH)
- Add Beneficial Bacteria (Lactobacillus)
- Promote Beneficial Bacteria (Oligosaccharides)
- Kill Bacteria – EO’s
- Stimulate Immunity

Nutritional Elements

- CHO
- Amino Acids
- Triglycerides
We now understand a lot of the science behind essential oils

Carvacrol

Cinamaldehyde

Capsaicin

Allicin
Essential oils are essential!!
Lysozyme!

An immunological support and antibacterial – naturally derived from microbial fermentation or from hyper-immunised egg technology
Why Welfare is Important?

- Outdoor production – versus indoor intensive – 40% of UK industry is outdoor bred – liked by consumers
- This is a visible indicator to consumers (who then complain about keeping pigs outdoors in winter !!)
- UK banned individual sow stalls in 2000 (rest of EU by 2012)  UK all straw based group housed systems
- Regulations on stocking densities
- Tail docking banned – but low compliance on this
- Teeth clipping banned – low compliance
- Weaning not less than 28 days – high compliance
- Compulsory use of manipulable materials for all pigs
- No castration of males
High Stocking Densities Reduce Performance

Stocking Density (m²/pig)

DLWG (kg/d) FCR

0.25 0.35 0.45 0.55 0.65 0.75 0.85 0.95 1.05 1.15

DLWG FCR

High Stocking Densities Reduce Performance
Effect of group size on weaned piglet performance

(Vermeer and Hoofs, 1994)
Lesion Scoring
Systematic subjective scoring of tail and body lesions

- Wounds
- Scratches
- Location

Ears

Photos: University of Newcastle
The EU Model – Data Flow
Thank You All For Your Attention