Ingredientes para dietas iniciais de leitões

Han Verdonk PhD, Nutritionist piglets and calves, 24 Out 2013
Content:

- Introduction The Netherlands
- Introduction Company De Heus
- Introduction Dutch Pig production
- Suckling & weaned piglets
- Ingredients for (pre)starter diets
Brazil
• 8.5 mln km²
• 193 million people
• 23/km²
• 33 million pigs
• 1.7 mln sows

The Netherlands
• 41.5 thousand km² (20% water)
• 16 million people
• 403/km²
• 12 million pigs
• 1 mln sows
World Pig Population By Country - 2011

Source: World pig population by country, according to Markosun 2011
Live stock in the Netherlands:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Millions</th>
<th>Per sq.km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broilers</td>
<td>55</td>
<td>1340</td>
</tr>
<tr>
<td>Layers</td>
<td>29</td>
<td>705</td>
</tr>
<tr>
<td>Turkeys</td>
<td>1.4</td>
<td>34</td>
</tr>
<tr>
<td>Pigs</td>
<td>11.6</td>
<td>282</td>
</tr>
<tr>
<td>Cattle</td>
<td>3.9</td>
<td>95</td>
</tr>
<tr>
<td>Sheep</td>
<td>1.2</td>
<td>29</td>
</tr>
<tr>
<td>Duck</td>
<td>0.9</td>
<td>22</td>
</tr>
</tbody>
</table>
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De Heus is a family owned, worldwide Player producing 4.4 mln ton feed
1911

Establishment of current company

15% market share
De Heus Animal Nutrition

- De Heus Sp. Poland
- Koudijs Kapo Feed, Egypt
- Koudijs Mkorma, Russia
- De Heus a.s., Czech
- De Heus LLC, Vietnam
- De Heus Feed PTY, South-Africa
- Alema Koudijs Feed, Etiopia
- Nutrifarms, Brasil
- Wellhope, China
International expansion since 2000
Where are we in Brasil?
Juntando forças em nutrição animal
Quality for people
Animal feed for food!
Together for better results
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Dutch pig production

History
Slaughter pig and stable in 1910:
Mixed Farm (cattle + pigs) in 1948:
Pig house in 1960:
Changes:

60 -70

- Better financing possibilities
- Number of pigs per farm ↑
- Level of knowledge ↑
- More technology and automation (mechanical ventilation)
- Concrete slatted floor (labour, hygienic condition)
Changes:

80

- Farms become bigger and more specialised
- All in, all out
- Vaccination and hygiene programs

1987 Government introduces “Pig Production rights”
And take 15% of pig places out of the market
Further growth farms from 1990
2013: Larger and more and more specialized farms:
Dutch pig production

- Independent family owned farms
- High technical input level
- Production in highly competitive system
- Focus on costs and details!
- Export oriented
Dutch pig production

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- High technical input level
- Production in highly competitive system
- Focus on costs and details!
- Export oriented
Pig sector in the Netherlands

Number of sows present: 969,000 sows
Total production piglets: 25 mln
Pigs slaughtered in NL: 17 mln
Piglets exported: 8 mln

Self sufficiency grade:
- meat 200 %
- Piglets 145 %
# Pig sector in the Netherlands

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sows present</td>
<td>969,000 sows</td>
</tr>
<tr>
<td>Total production piglets</td>
<td>25 mln</td>
</tr>
<tr>
<td>Pigs slaughtered in NL</td>
<td>17 mln</td>
</tr>
<tr>
<td>Piglets exported</td>
<td>8 mln</td>
</tr>
</tbody>
</table>

**Self sufficiency grade:**
- Meat 200 %
- Piglets 145 %
Recent developments/issues in dutch pig industry

- Piglets => no castration or anesthesia
- Sows (pregnant) => group housing, boxes are history
- Feed => ban on in-feed antibiotics
- Reduction of dust, smell and ammonia
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Pregnant sows in groups:
Hoofdstuk
Anesthesia for castration

- Selection
- Control
Results sows (2012)
278 farms, 424 sows

- Farrowing index: 2.37
- Number of Piglets
  - Live born / litter: 13.8
  - Weaned / sow / year: 28.6

Source: Agrovision 2013
Results sows (2012)
278 farms, 424 sows

- Farrowing index: 2.37
- Number of Piglets
  Live born / litter: 13.8
  Weaned / sow / year: 28.6

Results fattening pigs (2012)
887 farms, 1801 fattening places

- Growth (g/day): 791
- FCR: 2.58
- Mortality: 2.4%
- Meat %: 58.1

Source: Agrovision 2013
Number of live born piglets per litter

bron: Agrovision
Daily weight gain of fatteners also going up in the years:

bron: Agrovision
The last extra piglet can give the highest profit !!!!!

low feed cost, high meat production, high number of piglets
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**Suckling and weaned piglets**

- frequent consumption of small quantities of sow milk
- sow milk: lactose, protein and emulsified fat particles
- sow milk is very tasty and highly digestible!
Weaning

♦ Separation of sow and piglets
  ♦ 3.5 weeks of age
  ♦ suddenly

♦ Move to another pen

♦ Mix with piglets of other sows

♦ Different feed
♦ Shape, taste and smell, composition
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♦ Move to another pen

♦ Mix with piglets of other sows
  ♦ Different feed
  ♦ Shape, taste and smell, composition
Where am I?
What am I doing here?
Who are you?
Consequences

- Stress
- Low feed intake
Consequences

- Low feed intake is important determinant of:
  - Gut integrity ↓
  - Digestive capacity ↓
  - Absorptive capacity ↓
  - Permeability ↑, Barrier function ↓
  - Inflammatory response
  - Growth performance ↓

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- Tasty
- Good digestibility
  - Support gut structure and functionality
  - Favour beneficial microbiota in gut
  - Free/low in anti nutritional factors
  - Low/no risk for diarrhoea

- Good intake, digestibility and utilization of nutrients to use genetic growth potential of pigs!!
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Ingredients for (pre)starter diets

- Learn suckling piglets by supplying creep feed
- Same feed composition just before and after weaning
- Same physical form of feed before and after weaning
- Fade out high quality ingredients gradually
- Introduce new / standard ingredients gradually
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Ingredients: protein rich

- High ileal (protein) digestibility
- Low content fermentable protein
- Positive nutritional factors / protective components
- Low content anti nutritional factors
- Good aminoacid profile
- Tasty, free from off flavour
- No/low bacterial count
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Ingredients: positive components

- Immunoglobulins
- Lactoferrin, lactoperoxidase
- Glutamin, Glutamic acid
Ingredients: anti nutritional factors

- Protease inhibitors (Trypsin)
- Urease
- Lectin
- Glycoalkaloid (bitter components)
- Oligosaccharides (Stachyose, Raffinose, Verbascose)
- Tannin
Ingredients: anti nutritional factors

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- Eliminate and/or inactivate by selection or processing:
- Dehulling
- Extraction (alcohol, water)
- Extrusion (temp, moisture, pressure)
- Hydrolysis (enzymatic, chemical)
- Separation/filtration
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**Ingredients: ileal cp dig, aa profile**

<table>
<thead>
<tr>
<th></th>
<th>whey powder</th>
<th>milk powder</th>
<th>Potato Protein</th>
<th>Wheat Gluten</th>
<th>Blood plasma</th>
<th>Fish meal</th>
<th>SPC Extr</th>
<th>SPC Enz</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP %</td>
<td>12</td>
<td>24-35</td>
<td>80</td>
<td>60-80</td>
<td>82</td>
<td>65</td>
<td>60-65</td>
<td>55</td>
</tr>
<tr>
<td>il dig CP</td>
<td>&gt;90</td>
<td>93</td>
<td>85</td>
<td>89</td>
<td>86</td>
<td>85</td>
<td>86</td>
<td>84</td>
</tr>
<tr>
<td>Lys g/100g cp</td>
<td>7.5-8</td>
<td>7.8-8</td>
<td>7.8</td>
<td>1.8</td>
<td>8.5</td>
<td>7.5</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Glx g/100g cp</td>
<td>15.3</td>
<td>20.8</td>
<td>11</td>
<td>34.3</td>
<td>13.2</td>
<td>12.5</td>
<td>18.4</td>
<td>18.4</td>
</tr>
</tbody>
</table>

*Source: CVB 2011, Urbaityte et al 2009*
Ingredients: protein rich

- Dairy protein => whey powder, milk powder
  - high digestibility, lys >7.5 g/100g cp, protective substances (Ig, lactoferrin, lactoperoxidase), tasty

- Treated soy products low in ANF (TIA, urease)
  - extruded full fat soybeans
  - SPC (alcohol extracted), SPC (enz treated)
  - dehulled, high protein toasted soy bean meal

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Ingredients: protein rich

- Potato protein
  - refined, hydrolysed, low content glycoalkaloids
  Source Urbaityte et al 2009; ILOB/AVEBE 1999

- Wheat gluten
  - vital or enzymatically hydrolysed
  Source Urbaityte et al 2009
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  -> refined, hydrolysed, low content glycoalkaloids
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Ingredients: protein rich

- Spray dried blood plasma
  -> porcine origin, high content Immunoglobulins
  Source: Torrallardona 2010; van Dijk 2001

- Fish meal
Ingredients: protein rich

- Spray dried blood plasma
  - porcine origin, high content Immunoglobulins
  Source: Torrallardona 2010; van Dijk 2001

- Fish meal
Ingredients: carbohydrate rich

- Easily digested and absorbed or
- Easily fermented (into e.g. lactic acid)
- Pregelatinized (partly) (>80%)
- Low content oligosaccharides
- Content of prebiotic saccharides
- Low in admixture/impurities
- Low in mycotoxins
Ingredients: carbohydrate rich

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- Content of prebiotic saccharides
- Low in admixture/impurities (cleaned!!)
- Low in mycotoxins
Ingredients: carbohydrate rich

◆ Lactose
-> whey powder, whey products, milk powder, lactose
Source Doherty et al 2005, Mahan et al 2004

◆ Starch
-> cleaned wheat, barley, corn, rice, oats

◆ Fibres

◆ Prebiotic components:
Source Patterson & Burkholder 2003, vLeeuwen 2006
Ingredients: carbohydrate rich

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Source Patterson & Burkholder 2003, vLeeuwen 2006
### Englyst Starch classification based on digestibility

<table>
<thead>
<tr>
<th>Type of starch</th>
<th>Example</th>
<th>Digestion in small intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast digestible</td>
<td>Pregelatinised starch</td>
<td>Fast, complete</td>
</tr>
<tr>
<td>Slow digestible</td>
<td>Most grains</td>
<td>Slow, complete</td>
</tr>
<tr>
<td>Resistant Starch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physically inaccessible</td>
<td>Ground grains</td>
<td>Resistant</td>
</tr>
<tr>
<td>Resistant starch particles</td>
<td>Native potato starch</td>
<td>Resistant</td>
</tr>
<tr>
<td>Retrograded starch</td>
<td>Overheated/cooked</td>
<td>Resistant</td>
</tr>
</tbody>
</table>
**Strach fraction in (cooked) products (Patil, 1998)**

<table>
<thead>
<tr>
<th>Type of starch</th>
<th>Fast digestible</th>
<th>Slow digestible</th>
<th>Resistant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>299</td>
<td>73</td>
<td>136</td>
<td>508</td>
</tr>
<tr>
<td>Barley</td>
<td>249</td>
<td>121</td>
<td>182</td>
<td>552</td>
</tr>
<tr>
<td>Corn</td>
<td>371</td>
<td>156</td>
<td>252</td>
<td>779</td>
</tr>
<tr>
<td>Sorghum</td>
<td>292</td>
<td>139</td>
<td>361</td>
<td>792</td>
</tr>
</tbody>
</table>
Ingredients: carbohydrate rich

Feed the microbiota, don’t fight them!
Find the balance between carbohydrates with different digestion and fermentation kinetics in caecum and colon resulting in diversified, stable microbiota

Source: Awati 2005
Ingredients: fat/oil rich

- Highly digestible
- Low content moisture & impurities
- High content elutable matter
- Low content FreeFattyAcid
- Low PerOxide value
- Good fatty acid profile (MCFA, C12, unsaturated, linoleic acid, PUFA, EPA/DPA)
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- Fish/salmon oil -> rich in PUFA
  EPA C20:5 n-3 : 8-10%
  DHA C22:6 n-3 : 8-10%

- Refined Coconut oil/palmkernel oil -> rich in
  Lauric acid C12 : >45%
Ingredients: fat/oil rich

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  Lauric acid C12 : >45%
Ingredients: fat/oil rich

- Refined soy oil -> rich in unsaturated fatty acids
  Linoleic + Linolenic acid C18:2 + C18:3 : min 60%

- Sunflower oil

High fat diets generally lower T-lymphocyte proliferation and natural killer cell activation and act anti-inflammatory and immunosuppressive => fish oil most effective!

Source: Calder 1998, Blok 1996
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Source: Calder 1998, Blok 1996
Ingredients: Minerals & Additives

- High bio-availability
- Low buffering capacity (monocal instead of lime; fine instead of coarse!)
- Acids (citric, lactic, formic, benzoic, butyric, …)
- Prebiotics (FOS, MOS, TOS)
- Probiotics/Yeast
- Enzymes (Phytase, xylanase, glucanase)
- Sweetener, flavour
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Ingredients for (pre)starter diets: Example

- Fade out high quality ingredients gradually
- Introduce new/standard ingredients gradually

<table>
<thead>
<tr>
<th>Ingredients (%)</th>
<th>Prestarter</th>
<th>Weaner</th>
<th>Grower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregel corn</td>
<td>10</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Oil (fish, coconut, soy)</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Soya hipro</td>
<td>0</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Prestarter</th>
<th>Weaner</th>
<th>Grower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net energy (kcal/kg)</td>
<td>2850</td>
<td>2625</td>
<td>2500</td>
</tr>
<tr>
<td>Lactose (%)</td>
<td>11</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>
Make your piglets eat by supplying tasty, high quality feed and fresh water from few days of age!!.
Muito obrigado

Questions!
De Heus Nutrifarms: Powering progress