Innovations in Dairy

Regional Feed Centre, Bedded Pack Barns, Amazing Grazing

August 2013 EAAP France, Paul Galama
Dairy farmer sells grass and maize to feed centre

First feed centre in Netherlands since 2010

...in container...

...truck picks up container...
Feed centre stores roughage...

...and stores feed components...
and grain from arable farmers

...and makes total mixed ration (TMR)...
...and delivers it to 3000 cows on 28 farms
Motivation regional feed centre

- Scaling up dairy farms reaches limits of labour and yard
- Lower costprice: 1,5 -3,5 € / 100 kg milk
- less problems with land at distance
- Opportunities for ‘mixed farm’ on regional level

- Disadvantages
  - More traffic
  - Less control of feeding
Energy use (MJ per 100 kg milk)

1 Direct energy: use of fuels for transport and machinery and electricity
2 Indirect energy: purchase of feed and fertiliser, feed storage

<table>
<thead>
<tr>
<th></th>
<th>Without feed centre</th>
<th>With feed centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy farms and roughage</td>
<td>270</td>
<td>226</td>
</tr>
<tr>
<td>Concentrates</td>
<td>183</td>
<td>72</td>
</tr>
<tr>
<td>Concentrate replacers</td>
<td>-</td>
<td>94</td>
</tr>
<tr>
<td>Feed centre</td>
<td>-</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>453</strong></td>
<td><strong>410</strong></td>
</tr>
</tbody>
</table>

9% lower energy use with feed centre
Hot spots for feed centre

Many cows per square km within 15 km

Many arable farmers within 80 km or ...

first in Friesland

Ideas or initiatives
First impressions

- 5 of 28 farmers stopped
- Interesting for farms:
  - Small and large
  - ‘low’ feed efficiency
  - New
  - Willing to outsource feeding
- Make good contracts; arrange what can go wrong

More insight in efficiency cows and land
• Closing mineral loops
• Using wastes or by-products of industry
• Reduce proteïn import
• Better use of manure
Directions for developments

- One location:
  - Cattle rearing
  - Milking
  - Calving (Transition)
  - Crops
  - Feed storage
  - Manure storage

- More locations:
  - Coöperation between Specialized farmers

- Added value:
  - Region as an enterprise
  - Coöperation means 1+1=3

- Low costprice:
  - Dairy processing
  - Energy
  - Education
  - Recreation
  - Nature

Coöperation means 1+1=3
All on one farm yard

Regional feed centre

Regional cooperation (mixed farm, agropark, food cluster)

One location

More locations

Low costprice

Added value
Why bedded pack barns?

Freestall (with cubicles)  Bedded pack barn
Lie down
Lie down
Lie down
Lie down
Lie down
Lie down
Sustainability aspects

Drive of farmers
- Animal welfare, health and longevity
- Manure quality

Possible conflicts
- Emission (NH3, N2O, CH4) Government
- Milk quality Dairy Industry
- Landscape Local government
USA: Composting wooden chips and sawdust

Twice a day cultivate the bedding
7 m2 per cow bedding
Israël: bedding of dried manure
20 m² per cow
Composting (make ‘compost in the stable) wooden chips with aerating system

once a day mill the bedding

12 m2 per cow
After 10 to 12 months wooden chips is like ‘compost’
‘Compost bedding’
(buy compost)
10 m² per koe

50% ‘compost’
50% slurry
Bedding material used on grassland and arable land
‘Compost bedding’
(100% ‘compost’)

Green house, mobile feed mangels
25 m² per cow
no feed alley
Fertilizer pellets
Drivers and conflicts

Landscape

Animal welfare

M2 per cow

Environment

Economy
## Economics bedded pack barns

<table>
<thead>
<tr>
<th></th>
<th>Bedded pack barn vs freestall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment manure storage</td>
<td>-</td>
</tr>
<tr>
<td>Investment roof</td>
<td>++</td>
</tr>
<tr>
<td>Total investment</td>
<td>+</td>
</tr>
<tr>
<td>Yearly costs stable and bedding</td>
<td>+</td>
</tr>
<tr>
<td>higher production per cow</td>
<td>+</td>
</tr>
<tr>
<td>lower replacement</td>
<td>--</td>
</tr>
<tr>
<td>Total yearly cost</td>
<td>-</td>
</tr>
</tbody>
</table>
Nitrogen losses

<table>
<thead>
<tr>
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<th>Bedded pack barn vs freestall</th>
</tr>
</thead>
<tbody>
<tr>
<td>stable</td>
<td>++</td>
</tr>
<tr>
<td>land</td>
<td>-</td>
</tr>
<tr>
<td>total</td>
<td>+</td>
</tr>
</tbody>
</table>

Disc injection reduces 70% ammonia  Spreading ‘compost’ no emission
Measuring emission of ammonia and greenhouse gases

NH₃, N₂, N₂O, CH₄
## Animal welfare

<table>
<thead>
<tr>
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<th>Bedded pack vs freestall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time required to lie</td>
<td>+</td>
</tr>
<tr>
<td>Hygiene</td>
<td>0/+</td>
</tr>
<tr>
<td>Condition score</td>
<td>0</td>
</tr>
<tr>
<td>Skin injuries</td>
<td>++</td>
</tr>
<tr>
<td>Legs and claws</td>
<td>+</td>
</tr>
<tr>
<td>Natural behaviour</td>
<td>+</td>
</tr>
</tbody>
</table>
Thermofiele bacteria

log cfu / gram bedding and log cfu / liter milk

Bedded Pack Barn Freestall sawdust

Source: NIZO
Example of landscape
## Overall sustainability

<table>
<thead>
<tr>
<th>DRIVERS</th>
<th>Bedded pack vs freestall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal welfare and health</td>
<td>+</td>
</tr>
<tr>
<td>Manure quality: organic matter</td>
<td>+</td>
</tr>
<tr>
<td>Manure quality: availability nitrogen</td>
<td>-</td>
</tr>
<tr>
<td>Economics: stable and bedding</td>
<td>-</td>
</tr>
<tr>
<td>Economics: longer life</td>
<td>+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONFLICTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia emission: stable</td>
<td>-</td>
</tr>
<tr>
<td>Ammonia emission: land</td>
<td>+</td>
</tr>
<tr>
<td>Milk quality</td>
<td>-</td>
</tr>
<tr>
<td>landscape</td>
<td>+ / -</td>
</tr>
</tbody>
</table>
Why Amazing Grazing?

- Decline of grazing cows
  - Large herds
  - Milking robots
  - Control high production

- Need for innovations
  - Tools to support management
  - Farming systems (low cost and high tech)
  - Techniques

90% grazed in 2010
75% grazed in 2011 and 2012
1. Pasture based farming systems

- Calving season
- Milking robots and large scale
- All weather and low cost
2. Management by measurement
3. Auto Border Collie
(Virtual Electric Fence)
4. The truth of the cow

What can we learn from the behavior of the cow?
5. Pasture cleaner

How can we solve the problem of dung hills?
Points to continue

- Regional feed centre
  - part of ‘mixed farm’ or ‘food cluster’ in region

- Development bedded pack barns
  - bedding materials and management in different climates
  - synthetic floors
  - sustainability

- Amazing grazing
  - Decision support Tools
  - Farming systems: low cost and high tech
More information

www.voercentrum.nl
www.vrijloopstallen.nl
www.amazinggrazing.eu

Thanks for your attention

Innovation starts with imagination

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