Hog transportation

Danish experiences with transport equipment and practices

by

Leif Christensen, M.Sc.
Danish Meat Research Institute

e-mail: lch@danishmeat.dk
Opinion

Transportation of hogs is very “public”

- One reason to care

- Another is the losses
  - to avoid losses, all from farm to abattoir must “fit” together
  - losses is to be paid of by somebody

Describe equipment required to reach the goal
What have DMRI been doing

We link the farm together with transportation and unloading at abattoir

- Guidelines for the farmer
- Requirements for the haulier
- Requirements for the abattoir

Research + use of Rule-of-Thumb + common sense put together into so-called "handbooks"
The ”Leit-motif”

Loading at farm must be quick
- The loading facilities must correspond the vehicle in use
- The vehicle must be able loading quick to avoid animals to wait e.g. in hot weather conditions

At the abattoir unloading must be quick too, for the same reasons as mentioned above
Know – How and Research

All systems must be based on the behavior of hogs

Research must be made in a practical way and “helping the abattoirs”, meaning solving problems and not creating them

Research is one way, but it always leave a lot of questions and then we use “the common sense” solving the “rest” of the problems until we know better
During the latter 15 years, DMRI has made or been part in several surveys and just to point out a few:

1. In 1995 about m^2 per hog, showing:
   - Could not find differences, driving short term, between m^2 from 0.35 to 0.42 per 100 kg hog
   - Suspension system was important and air should be used.

Link point 14 in the hand out paper
2. In 2007 (optimised / traditional vehicle) showing:
   - Forced ventilation is necessary in a non moving vehicle (min. 75 m³ / h / 100 kg hog)
   - Temperature increase 0.21°C/minute without forced ventilation and 0.1°C/minute with
   - DOA reduced from 0.07 to 0.011 %
   - DOA higher when T > 15°C (in the compartment)
   - No DOA seen with T below 5°C (in the compartment)

Link point 14 in the hand out paper

75 m³ = 2650 feet³, 100 kg = 220 pound, 0.21°C = 32.38 F, 0.1°C = 32.18 F, 15°C = 59 F, 5°C = 41 F
3. In 2007 (transportation 8 to 10 h) showing:
   - Forced ventilation is necessary in a non moving vehicle (min. 75 m³ / h / 100 kg hog)
   - DOA 0.012 % after 8 to 10 h and corresponding to the national level of 0.011 % (figures from 2006)
   - DOA higher when T > 20°C (in the compartment)
   - DOA seen when T > 20°C and RH > 80 %
     (during loading and with a non moving vehicle)

Link point 14 in the hand out paper

75m³ = 2650 feet², 100 kg = 220 pound, 20°C = 68 F
What did we learn?

"Never stop a laden vehicle, not even before loading"

or

see the next pages
A bigger farm have approx. 23 sec. per hog for loading
- Using less time he will have a bonus
- Using more time he will have a reduction

Is it animal welfare:
In an abattoir you can unload more than 1200 hogs per h

This farm is using 40 % more time
Room for delivery is normal, but normally bigger and divided in smaller compartments (15 hogs)

Most hogs is not presented for delivery, but has to be driven from the stall

The ramp is narrow, approx. 3 feet and don’t fit the ramp of a vehicle approx. 8 feet.

The slope of the ramp is approx. 40 degrees and at the same time a bit slippery.

Remark the low munted hinge and the bars
Delivery (more from the same farm)

Some positive installations

Lighting system, winter time and early morning

A gutter can be the solution moving pigs forward and will probably satisfy the driver

Investing approx. $ 3.000, the delivery time will be average and with a pay-back time of approx. 2 years
Transportation

All the vehicle know – how about equipment is described in a trade demand handbook called the HST (Handbook Sweine Transport)

All hauliers has to construct bodies according to HST

The HST is much more strict than the legislation, but always focus on equipment that gives no injuries and a mortality rate as low as possible

No abattoir competition in Denmark about transportation
Transportation, vehicles in use

Two older models, but still in use:

The upper with 3 tier, 180 hogs
the lower with 2 tier 120 hogs

Both having forced ventilation, a roof that can be lifted, tail gate lift or long ramp, air-suspension, and 15-18 hogs per compartment
Vehicles in use, new models

Constructed according to the newest know - how and must e.g. fulfil:

1. Full air-suspension
2. Body of double sited aluminium
   Reason: To prevent heat coming in to the body (mortality)
3. The roof must be of double fibre plates (plastic) and insulated
   Reason: To prevent heat coming in to the body (mortality)
4. Floorings of rubber or epoxy with small stones
   Reason: To prevent hogs with blood splash in hip bone area and tender loin and have noise reducing effect = easier loding
5. Compartments gates per 15 hogs (of 100 kg = 220 pound)
   Reason: To avoid hogs falling during brakes and it fits lairage size
Vehicles in use, new models

Constructed according to the newest know-how and must e.g. fulfil:

6. Tail gate lift or a ramp, width as the vehicle (approx. 2.3-2.4 m, corresponding to 8 feet). Angle below 30 degrees when loading and 0 degrees when unloading
   Reason: Making loading and unloading fast

7. No internal ramps, the tiers must be moveable
   Reason: To avoid injuries and provide sufficient height for the driver when loading / unloading which will go faster

8. Natural ventilation, > 20 % of flooring area
   Reason: Legislation, trade demands require more free area and closer to 25 % of flooring area
Vehicles in use, new models

Constructed according to the newest know - how and must e.g. fulfil:

9. Forced ventilation, up to 75 m3 / h / 100 kg (2650 feet2/h/220 pound)
   Reason: Legislative > 8 h travel time, but trade demands from > 0 h driving and necessary to reduce mortality

10. Misting system
    Reason: As above and the third step in cooling hogs (first natural ventilation, then forced ventilation and finally the misting system)

12. Temperature measuring device (highest/lowest shown in a display in the drivers cabin)
    Reason: The only way to know if body temperature is acceptable

13. GPS system
    Reason: Legislative > 8 h driving, but trade demands > 0 h
Transportation, vehicles in use

Equiped with:

- forced ventilation,
- roof that can be lifted
- long ramp,
- air-suspension,
- 15 hogs per compartment,
- misting system
- rubber floorings,
- temperature measuring device
- GPS-system

In use for > 50 % of the vehicles

Latest model:
With 3 tier, containing 180 to 200 hogs
Unloading at abattoir

AI incoming transports is scheduled (e.g. 8 AM +/- 1/2 h)

There is always a veterinarian control
- Injured hogs should be shot at the vehicle

DOA’s is paid by:
- The farmer + haulier + abattoir (1/3 each)
- The haulier
- The abattoir can accept a suspect hog unloaded and if the hog die in two hours it will be considered DOA
Mortality, hogs

DOA and DIP, hogs (2007: 0.007 + 0.006 = 0.013 % in total)

Mortality %

Year


Breed

Equipment

DOA
DIP
Total

DOA
DIP
Total
Unloading at abattoir

The unloading bay must be horizontal and non slippery.

Comming from poor vehicle floorings or handling at unloading,

These incidents we don’t want to see and they give an immediate reaction from the vets. at the bay.
Unloading at abattoir

The recommendation for the unloading bay is:

- The ramp as wide as the ramp of the vehicle (2.3 to 2.4 m (approx. 8 feet))
- Adjustable ramp
- Ramp with rubber surface

- A captive bolt pistol, just in case
Why choose right equipment

The public opinion and the cost:

- 1 DOA is the same as loosing:
  - $165/hog + lost earnings + handling and destruction, giving a total of approx. $330
- With the Danish figures (19,245,994 hogs slaughtered per year), this is giving $800,000 per year
Why choose right equipment

Other costs:

- Surveys during the years (mine in abattoirs) has shown that downgrading in meat quality can be divided as follows:
  - Farm: Genetics and loading. 15 - 25%
  - Transport: Equipment and unloading. 15 - 25%
  - Lairage: Treatment, equipment. 15 - 20%
  - Stunning: Equipment, methodology. 40 - 60%

Losses due to transportation can then be added $1,440,000
Total losses

DOA
DIP (estimated 90% caused by transportation)
Downgrading of meat quality

-Totally estimated (using Danish figures)
  $ 2,240,000

(NB: We don’t see this kind of downgrading in meat quality because of the optimised system from farm to abattoir)

The cost of a fan is approx. $400 – 500 = 2 to 3 DOA’s
The HST (40 + 40 pages)

- Requirements for construction
- Based on functions only
- Attached some solutions how to fulfil requirements
- 40 pages requirements
- 40 pages control list for the constructor to sign = he takes responsibility

New edition in 2008
The education

Transportation of live animals

Content:

- Animal behavior / physical needs
- Requirements vehicles and use
- Problem areas
- Delivery rooms (farm)
- Cleaning and disinfection
- Legislation
- Test and diploma

Diploma must be in drivers cabin
# Most important differences USA / DK

<table>
<thead>
<tr>
<th>DK</th>
<th>USA</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x alu. walls</td>
<td>1 sited alu. walls</td>
<td>Heat transfer</td>
</tr>
<tr>
<td>Insulated roof</td>
<td>?</td>
<td>Heat transfer</td>
</tr>
<tr>
<td>Rubber floorings</td>
<td>Alu. floorings</td>
<td>Bruisers</td>
</tr>
<tr>
<td>Lift or ramp, 8 feet</td>
<td>Ramp 3 feet</td>
<td>Speed</td>
</tr>
<tr>
<td>Move able tier / roof</td>
<td>Fixed</td>
<td>Speed / workers environment</td>
</tr>
</tbody>
</table>
# Most important differences USA / DK

<table>
<thead>
<tr>
<th></th>
<th>DK</th>
<th>USA</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural ventilation</td>
<td>Natural vent.</td>
<td>Heat transfer</td>
<td></td>
</tr>
<tr>
<td>Forced ventilation</td>
<td>No</td>
<td>Heat transfer</td>
<td></td>
</tr>
<tr>
<td>Misting system</td>
<td>No</td>
<td>Heat transfer</td>
<td></td>
</tr>
<tr>
<td>Monitoring temp.</td>
<td>No</td>
<td>Follow temp., can react quick</td>
<td></td>
</tr>
<tr>
<td>DOA 0.007 %</td>
<td>0.12 %</td>
<td>Diff. 17 times</td>
<td></td>
</tr>
<tr>
<td>DIP 0.006 %</td>
<td>0.12 %</td>
<td>Diff. 20 times</td>
<td></td>
</tr>
<tr>
<td>Injuries ”0 %”</td>
<td>0.06 %</td>
<td>Info from USA</td>
<td></td>
</tr>
</tbody>
</table>
Almost all shown for hogs also exist for cattle

Handbook for vehicle equipment
- HKT (Handbook Cattle Transport)

Education (trade demands)

Proposal for work for delivery systems
- Not a part of the work program at the moment
Final

• Thanks for your attention

• Any questions?