Joint Research Centre (JRC)

Study on temperatures during animal transport

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Objective of the study

Compare temperature standards in force and standards proposed by scientists with the actual practices of long distance commercial transport in the EU (study commissioned by DG SANCO)

Species	Type	Reg.(EC) 1/2005		EFSA recommendations		
		Min	Max	Min	Max	
					RH<80%	RH>80%
Pigs	≤ 30 kg >30 kg	5 (±5)	30 (±5)	14 10	32 25 (30)*	29 25 (30)*
Cattle	≤ 6 months >6 months			5 0	30 30	27 27
Sheep	Full fleece Shorn			0 10	28 32	25 29
Goats				6	30	27
Equidae				-	-	-

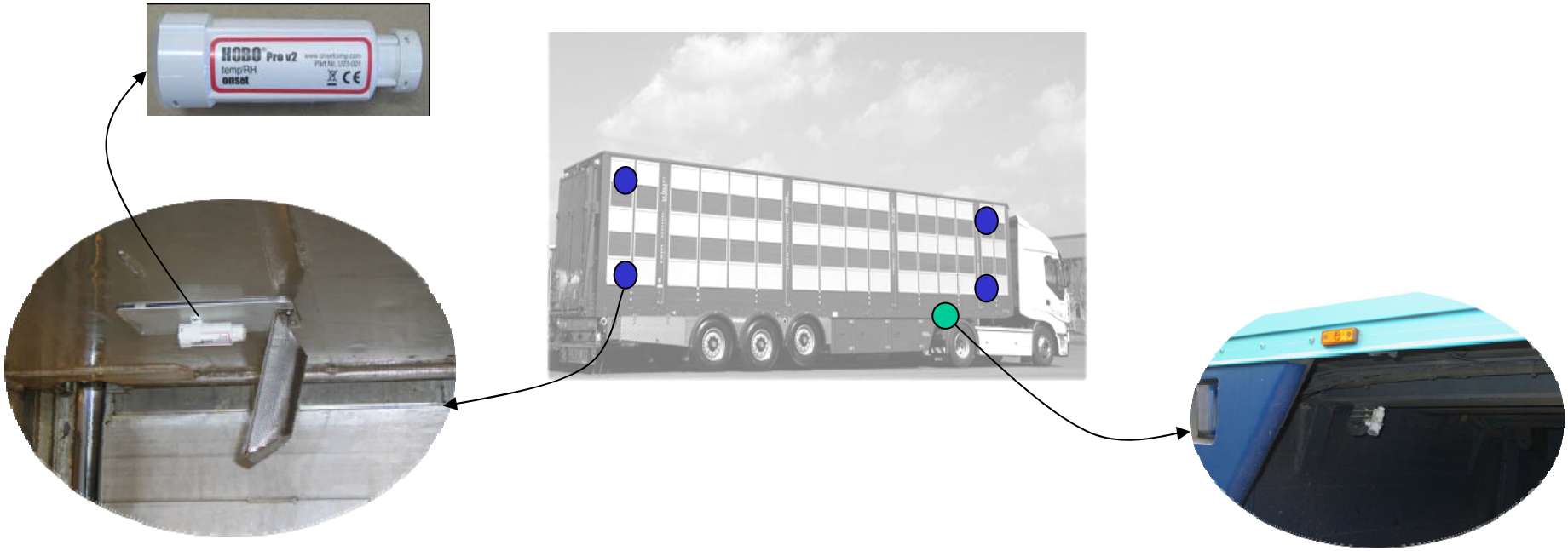
* with mechanical ventilation and misting devices

Scope

- 10 transport companies in 5 Member States
- 21 vehicles (7 trucks, 12 semi-trailers, 2 trucks & trailers)
- From February 2008 to February 2009
- 139 data loggers providing continuous recordings of temperatures and humidity at 15’ minutes intervals inside and outside vehicles

Methods

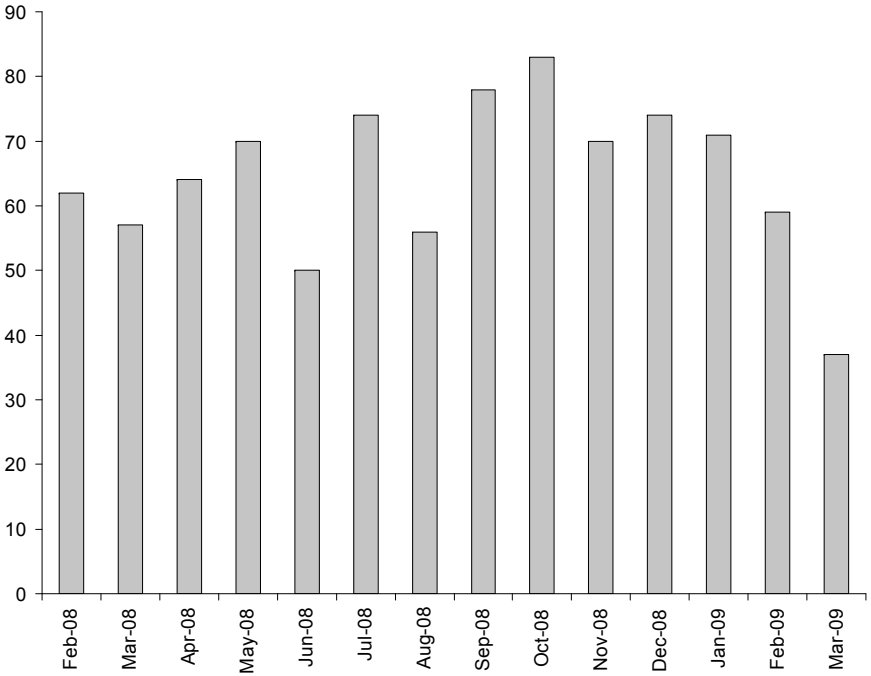
- On each vehicle 4 internal + 1 external sensor

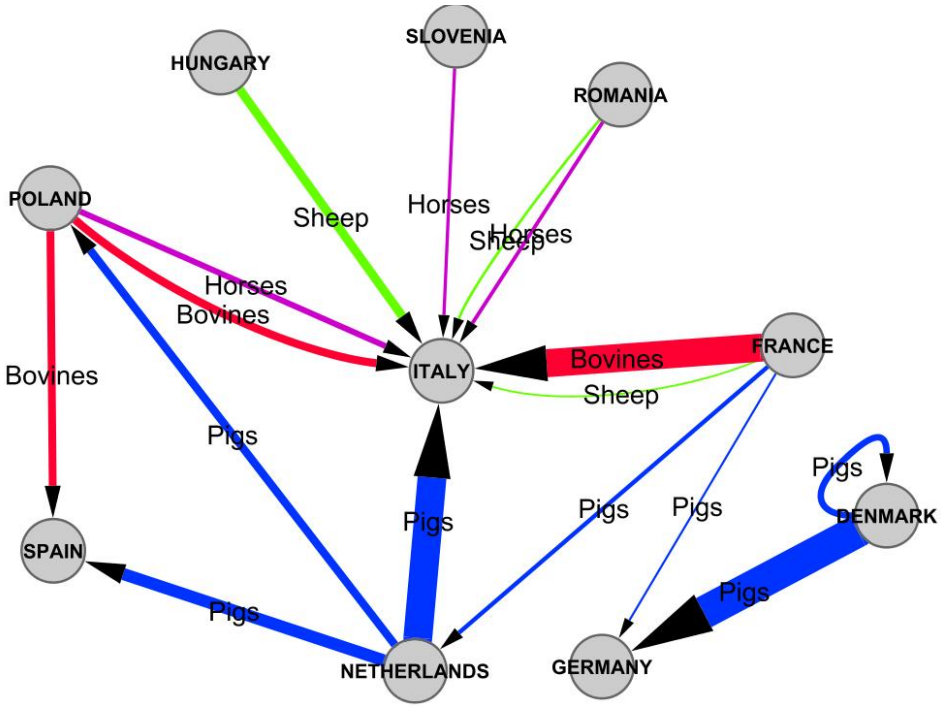


- Animal transports identified on the basis on transporters declarations (TRACES documents)

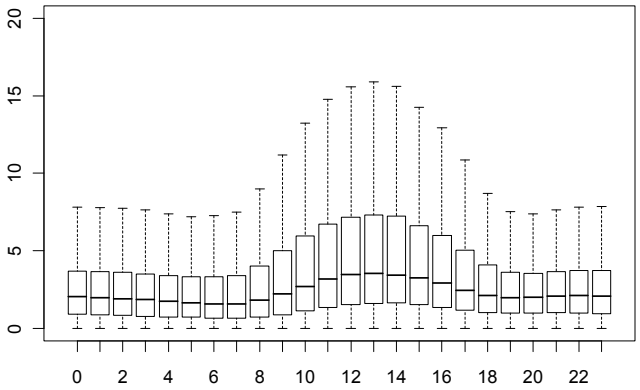
Data

4 Mio records of temperature and humidity, 0.5 of which related to 905 animal transports on major trade flows identified on the basis of TRACES data





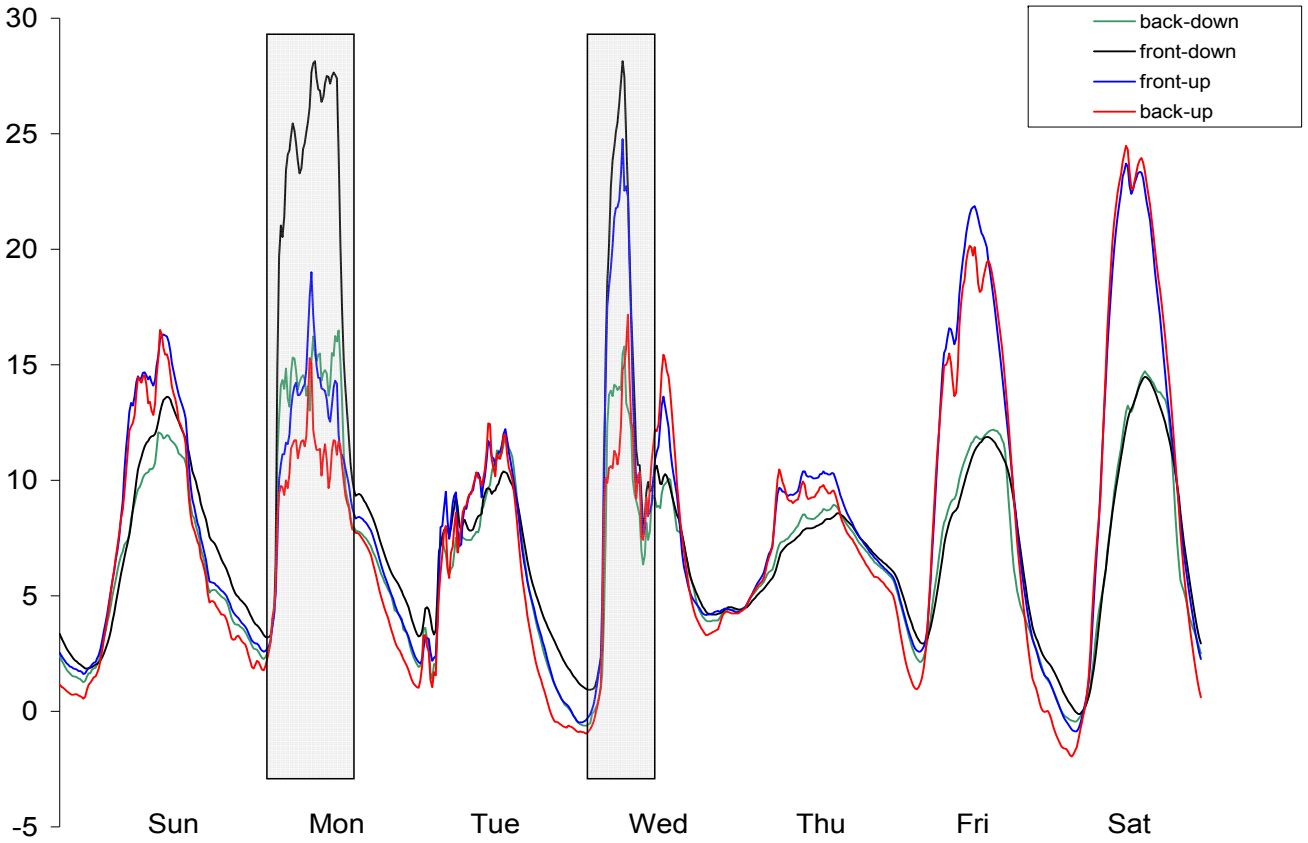
Variations of temperatures on the vehicles



Differences of Temp. between internal sensors > 10°C in 7% of cases

Increase of temperatures in the front down compartment during animal transports

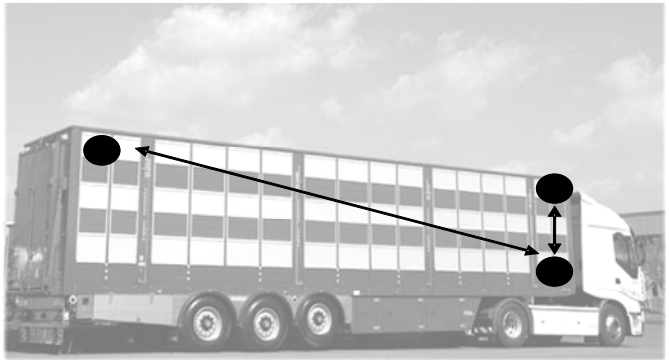
Increase of temperatures in the upper tier during the central hours of the day with vehicle not moving



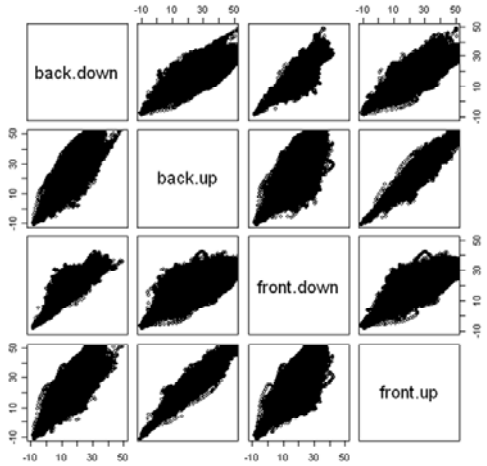
Correlations between positions

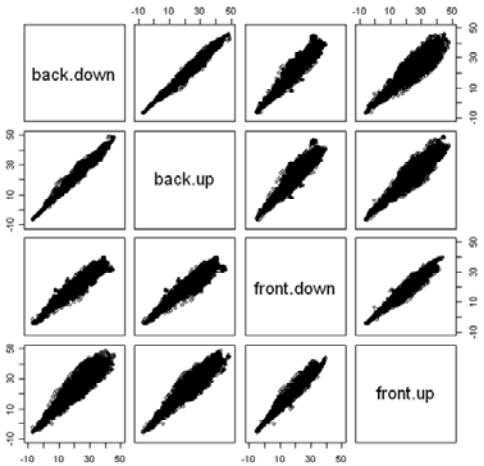
	Back down	Back up	Front down	Front up
Back down	1.00			
Back up	0.92	1.00		
Front down	0.95	0.87	1.00	
Front up	0.93	0.99	0.89	1.00

Similar behavior (stronger correlation) of Temp. on same tier Differences (weaker correlation) between front down - back up and front up – front down



In multi-tier semi-trailers at least 3 sensors at points of weakest correlations would ensure representivness of conditions

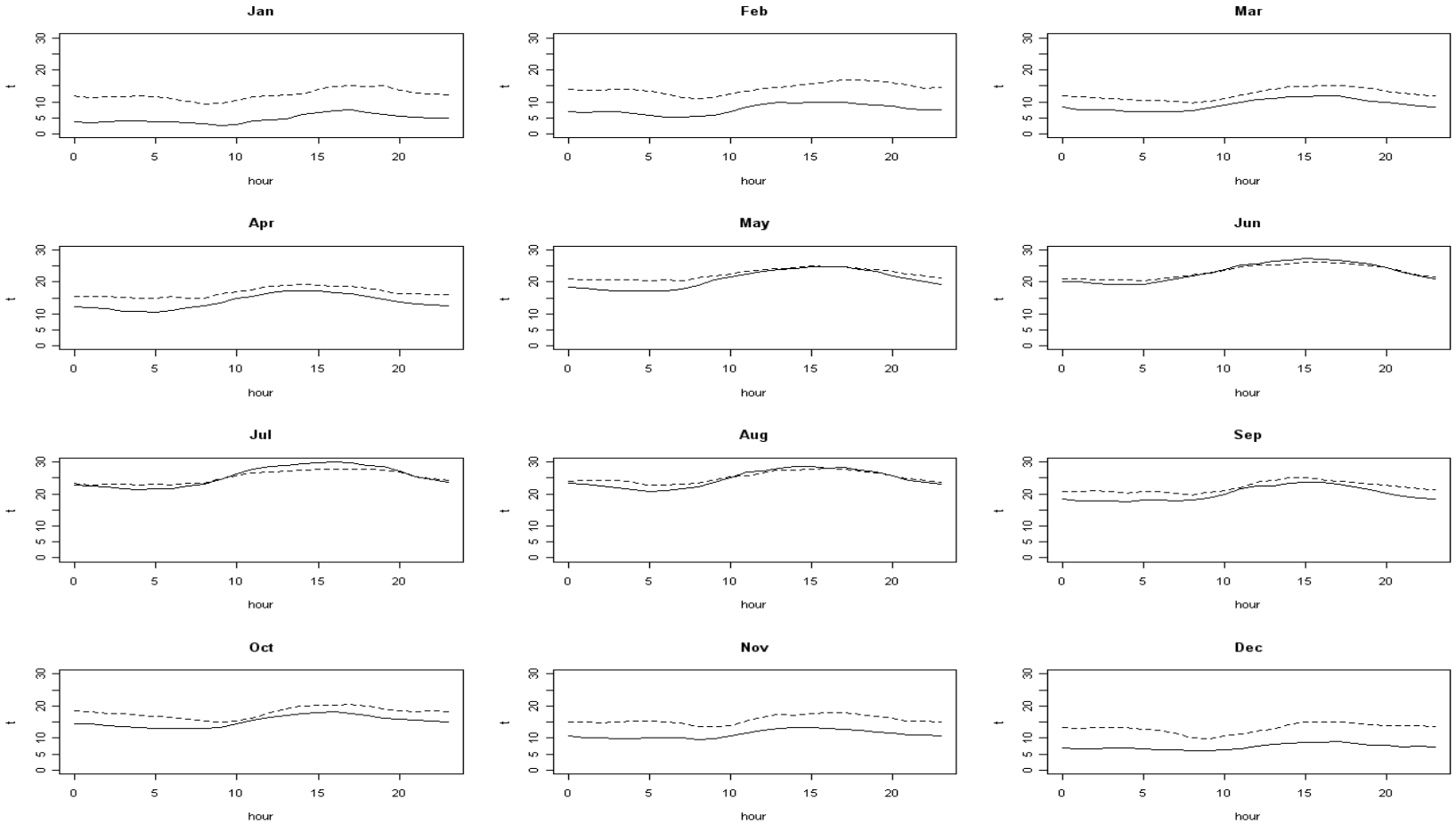




In mono-tier vehicle strong correlation between all sensors; 1 sensor would ensure representivness of conditions

Temperatures and presence of the animals

Temp during animal transports by month and hour of the day. Dotted line temp in front down sensor; continuous line temp in external sensor



With up to ~ 20°C of external Temp., the presence of animals causes an increase of Temp. in the front down sensor. The increase of Temp. is more prominent for transports of pigs < 30 kg

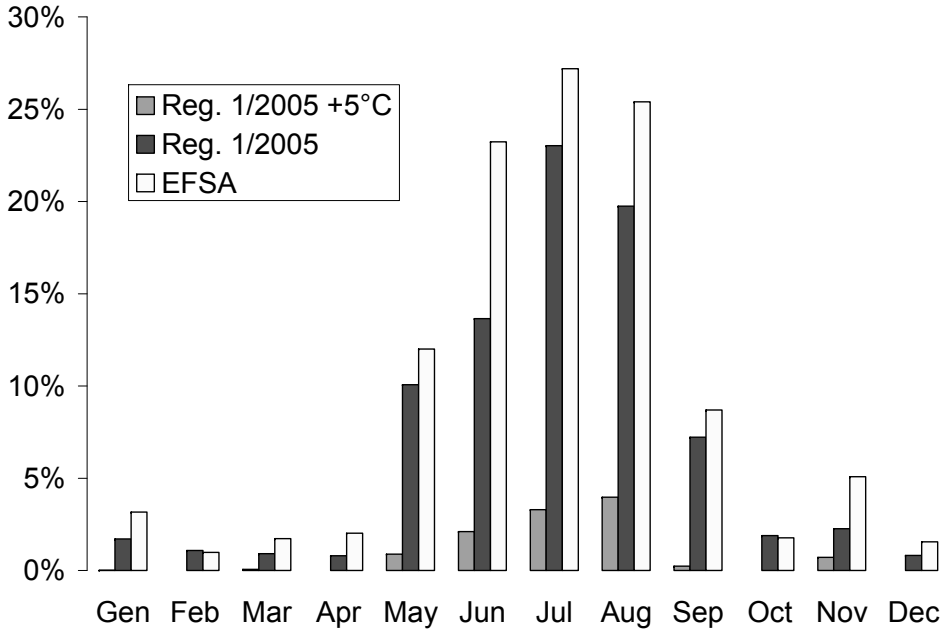
Impact of temperatures thresholds

	% of transports with at least one case of non-compliant occurrence	Average number of non-compliant occurrences per journey	% of journey time in which the threshold was exceeded
High temperatures tresholds			
35º C	8%	11	1%
30º C	36%	18	6%
EFSA	40%	23	8%
EFSA ≥ 2h	17%		
Low temperatures tresholds			
0º C	17%	21	3%
5º C	46%	42	18%
EFSA	58%	51	26%
EFSA ≥ 2h	44%		

EFSA thresholds produce higher percentage of non-compliant conditions, in particular for the lower threshold

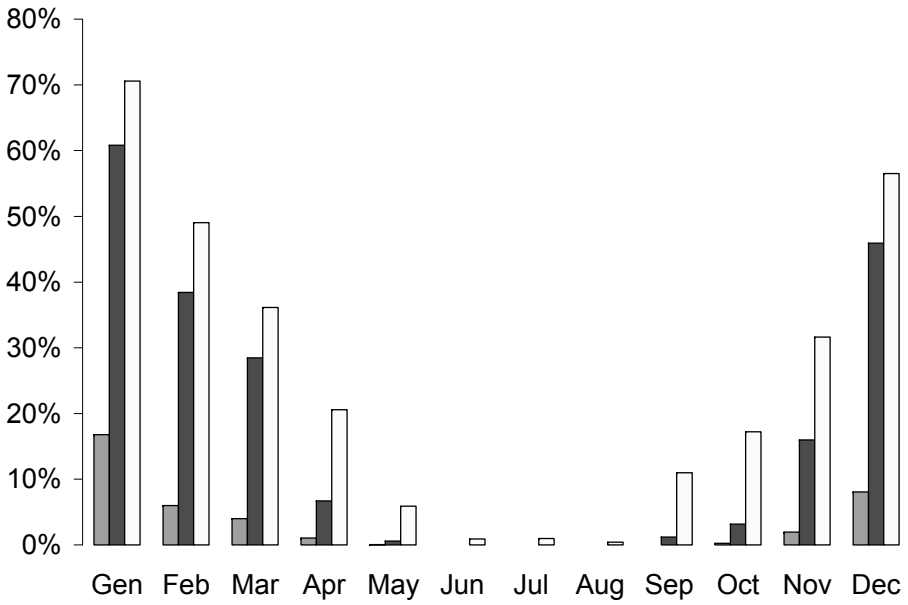
Some reduction of non-compliant transports could be achieved by considering duration of consecutive periods at non-compliant temperatures (e.g. ≥ 2 hours)

Impact by month

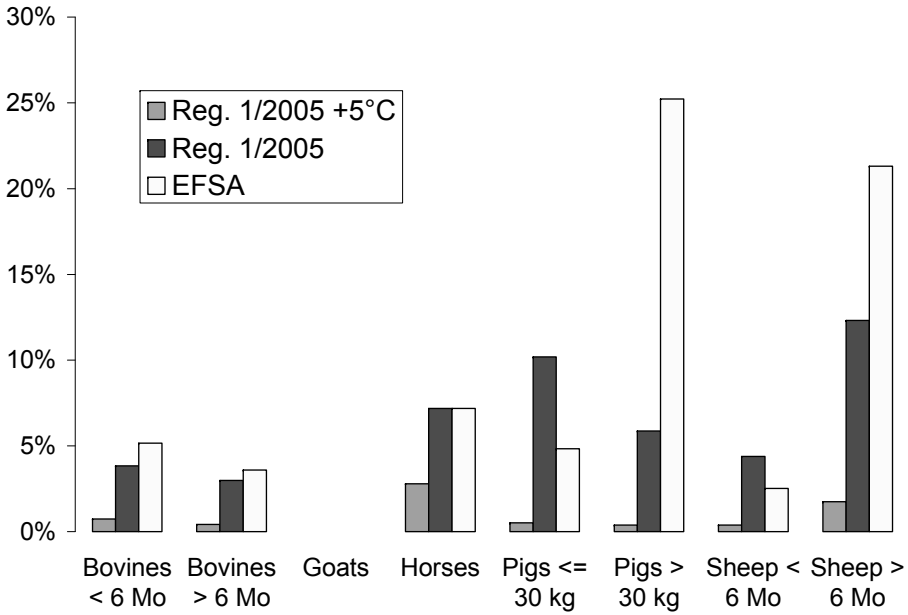


In July, % of journey times in which the upper threshold was exceeded:
23% for the 30º C limit
27% for the EFSA limits

In January, % of journey times in which the lower threshold was exceeded:
60% for the 5ºC limit
70% for the EFSA limits

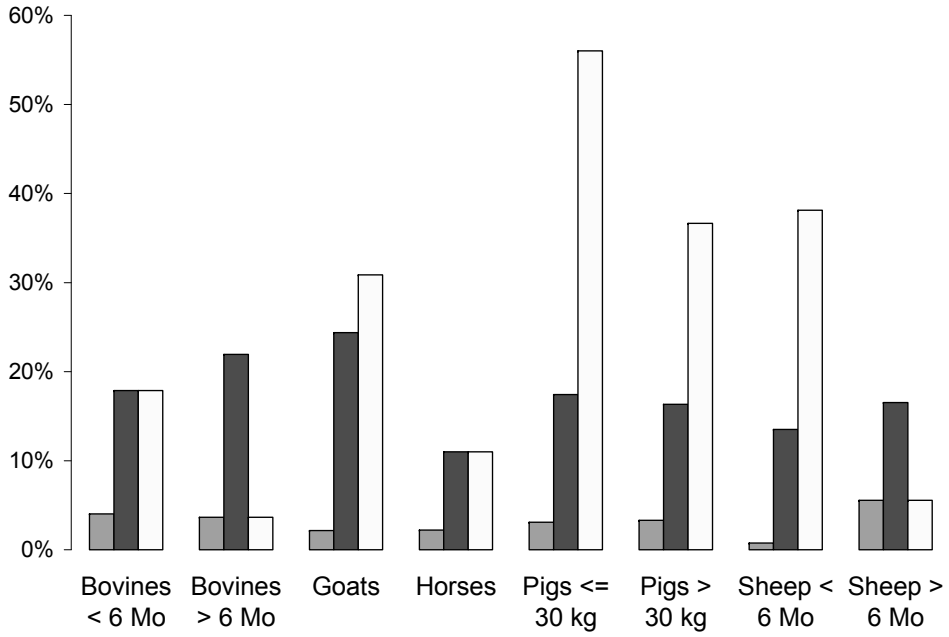


Impact by species

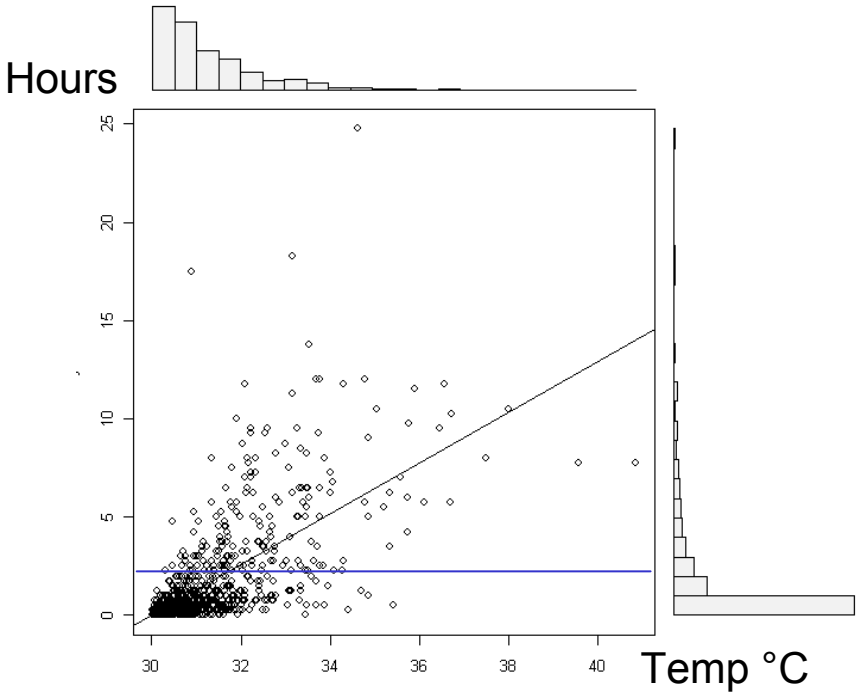


EFSA limits for high temperatures resulted more severe in pigs > 30 kg and sheep > 6 months
On the contrary in pigs < 30 kg and sheep <6 months

EFSA limits for low temperatures resulted more severe in particular in pigs and sheep < 6 months.
On the contrary for bovines and sheep > 6 months

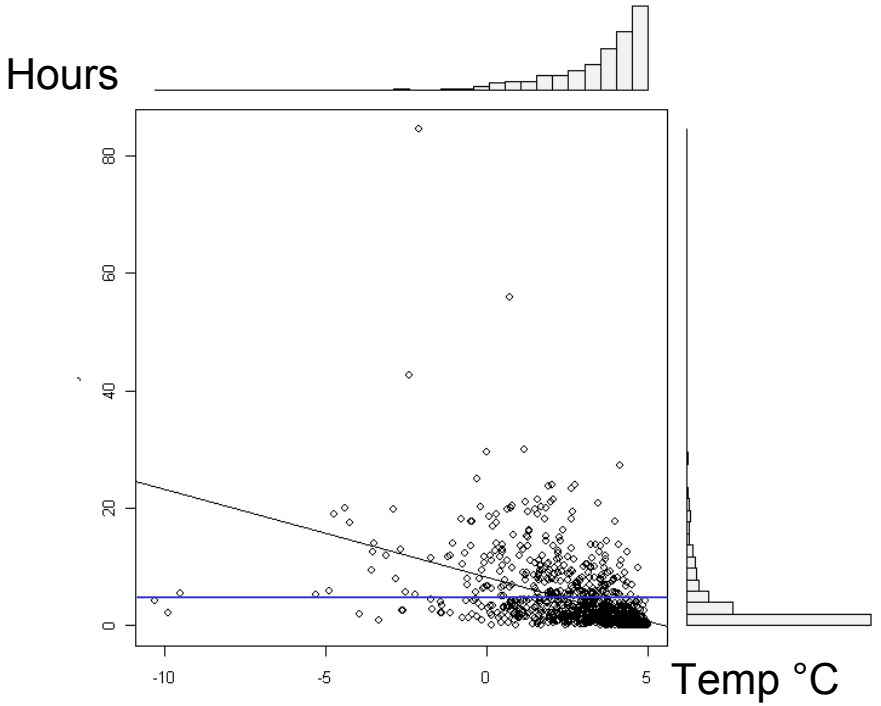


Impact by duration

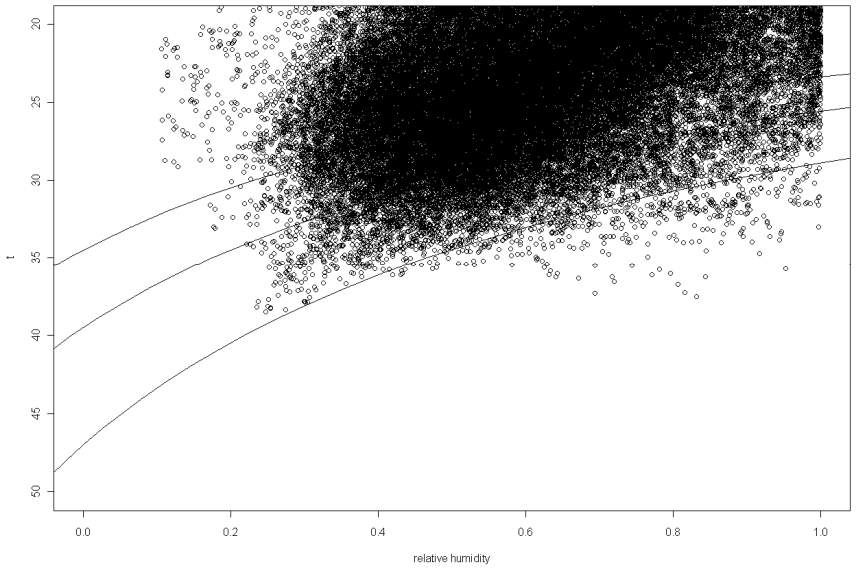


High temperatures exceeded 2 hours of consecutive duration in 23% of cases

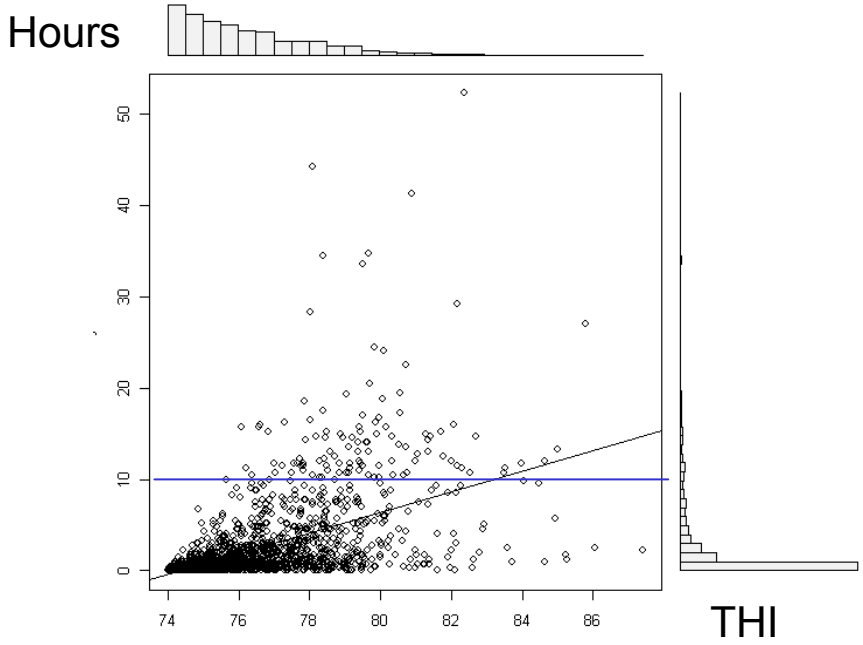
Low temperatures exceeded 2 hours of consecutive duration in 38% of cases



Temperatures and humidity



Only 6% of cases of THI > 74 had durations >10 hours

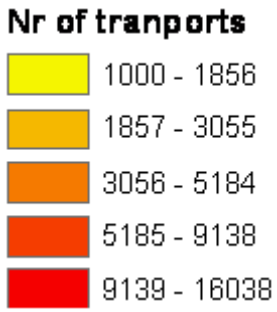


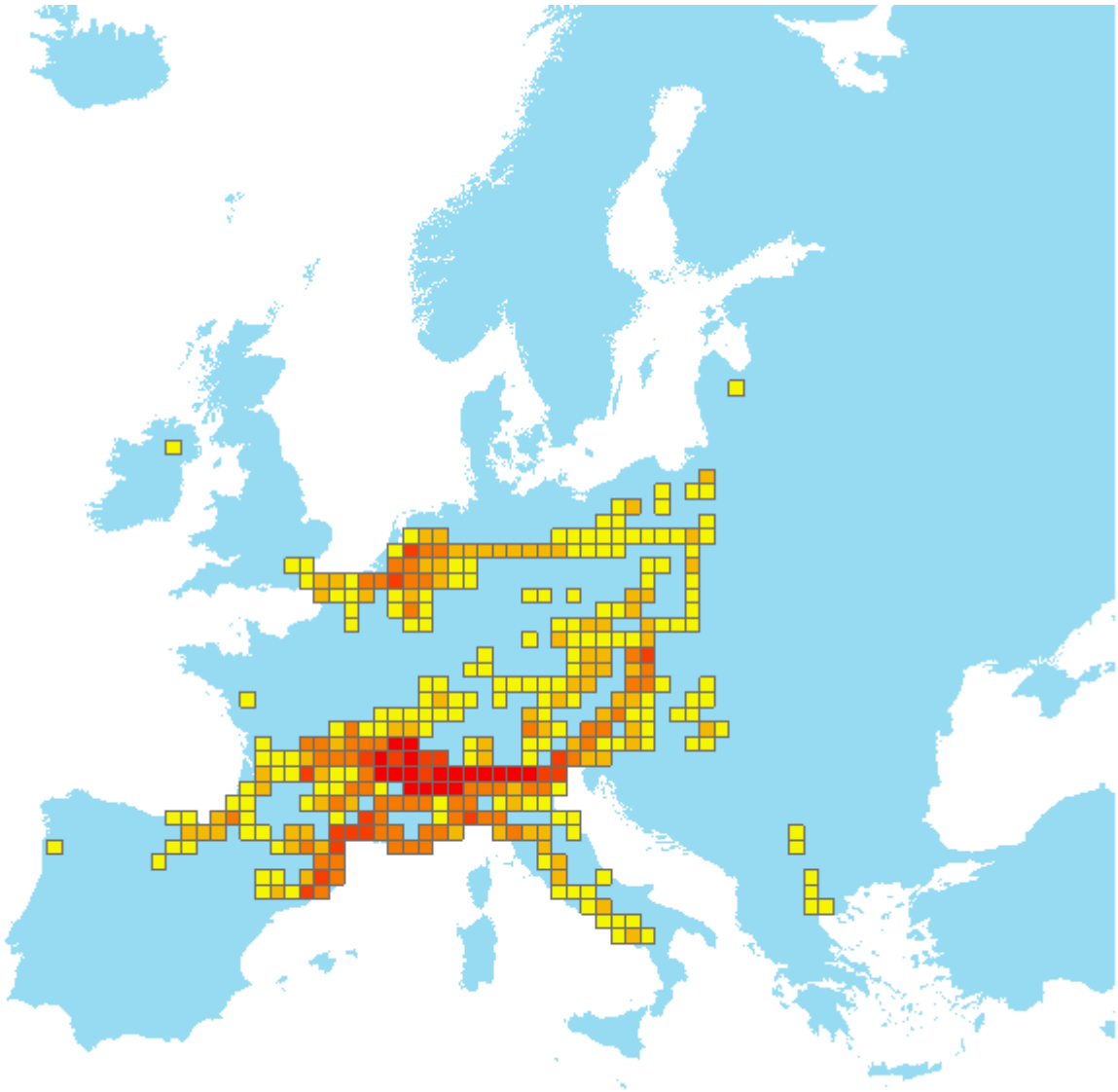
Temperature Humidity Index against thresholds of the Livestock Weather Safety Index (measuring productivity decrease in bovine animals)

83% < 74 (onset of thermoregulation)
10.5% between 74 and 78,
6% between 78 and 84,
0.5% > 84 (emergency)

Trade flows and climatic conditions (preliminary results)

Routing (where and when) of 85,593 bovine transports in 2008 (72% of total)





Source: TRACES

Trade flows and climatic conditions* (preliminary results)

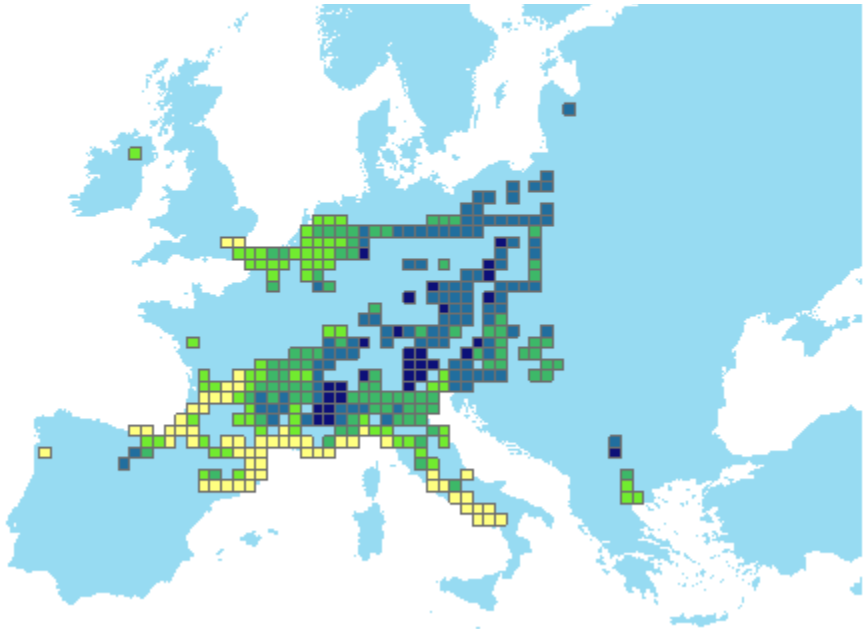
Bovine transports in 2008 with Temp<5 / Total transports

- 0% - 7%
- 8% - 14%
- 15% - 20%
- 21% - 28%
- 29% - 46%

% of transport times with T<5°C:

17% **(model on 70,653 transports)***

21% **(study with sensors on 282 transports)**



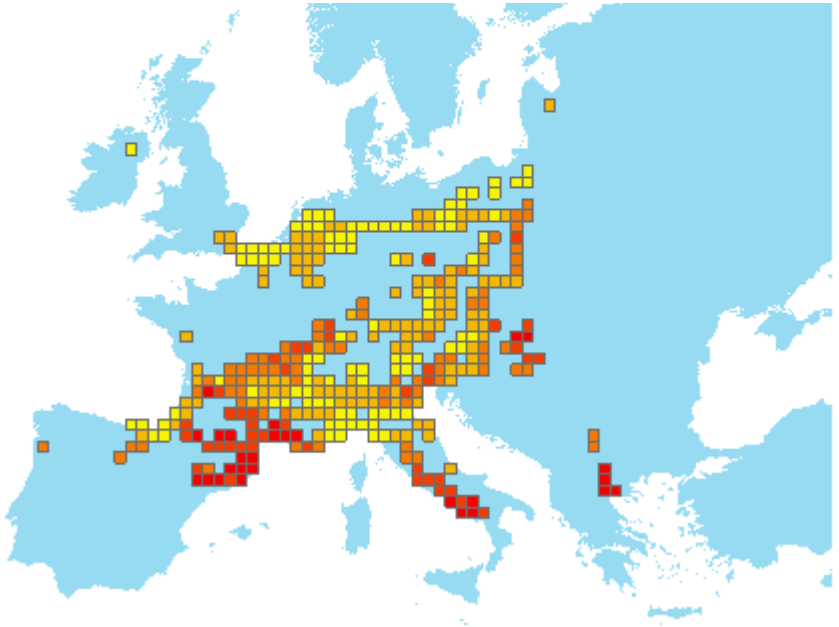
Bovine transports in 2008 with Temp>30 / Total transports

- 0% - 2%
- 3%
- 4% - 5%
- 6% - 8%
- 9% - 16%

% of transport times with T>30°C:

3% **(model on 70,653 transports)**

3% **(study with sensors on 282 transports)**



* Data from Jan to Oct 2008. Source of climatic data: JRC/MARS database.

Thank you!

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