Operation conditions of refrigerator and freezer in private homes in Europe with relevance to food storage quality

Rainer Stamminger

for

3rd CCM workshop

Background

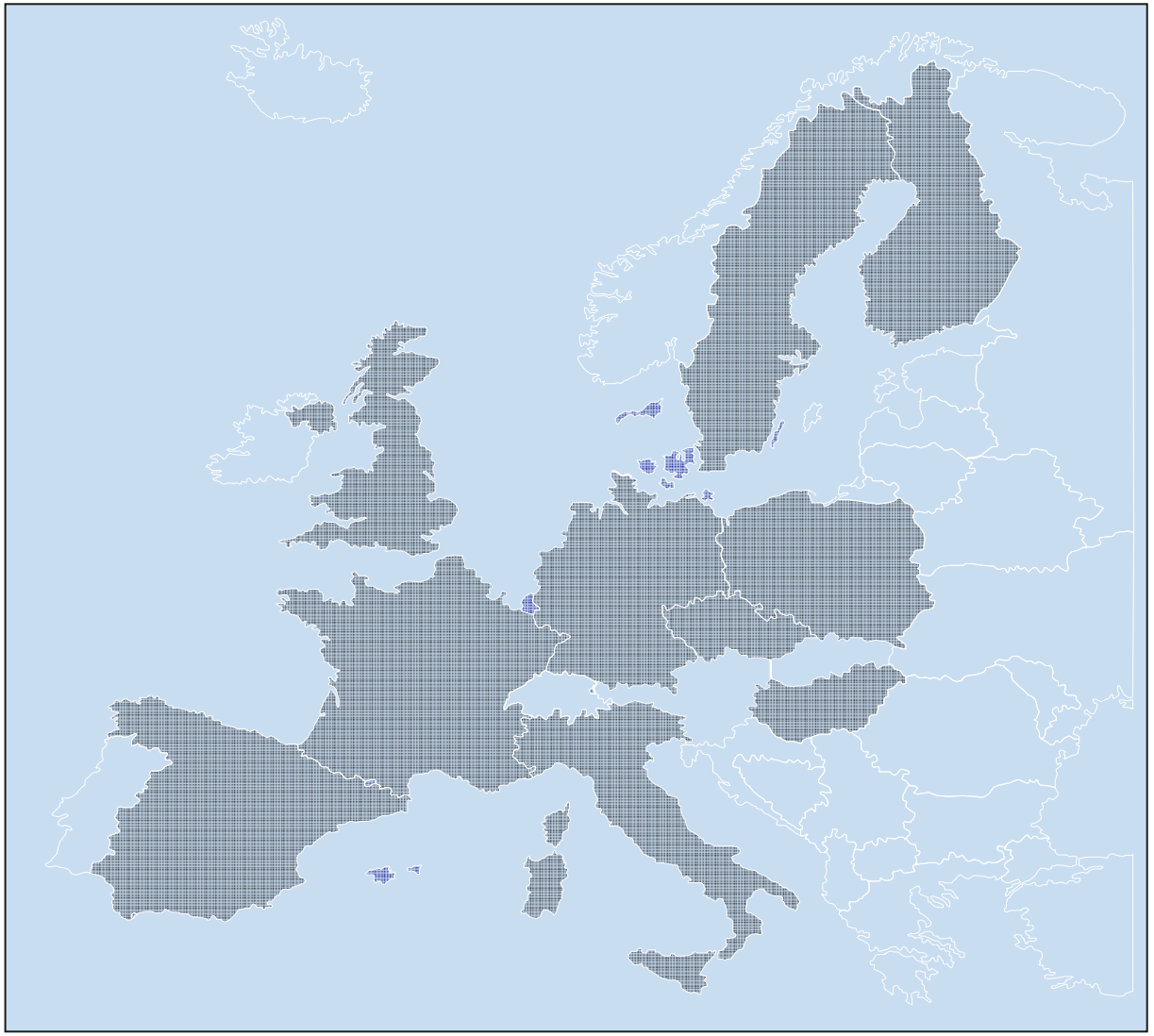
- European Commission is working on a program to renew its Energy policy for Energy using Products (EuPs)
- Studies are launched per product category to assess ‚Eco-Design' for these products
- „Lot 13" is the study on refrigerators and freezer (www.ecocold-domestic.org)
- Uni Bonn / *Household Appliances and Technology Section* has made the assessment of ‚Consumer behaviour' for Lot 13

Consumer survey

Demography

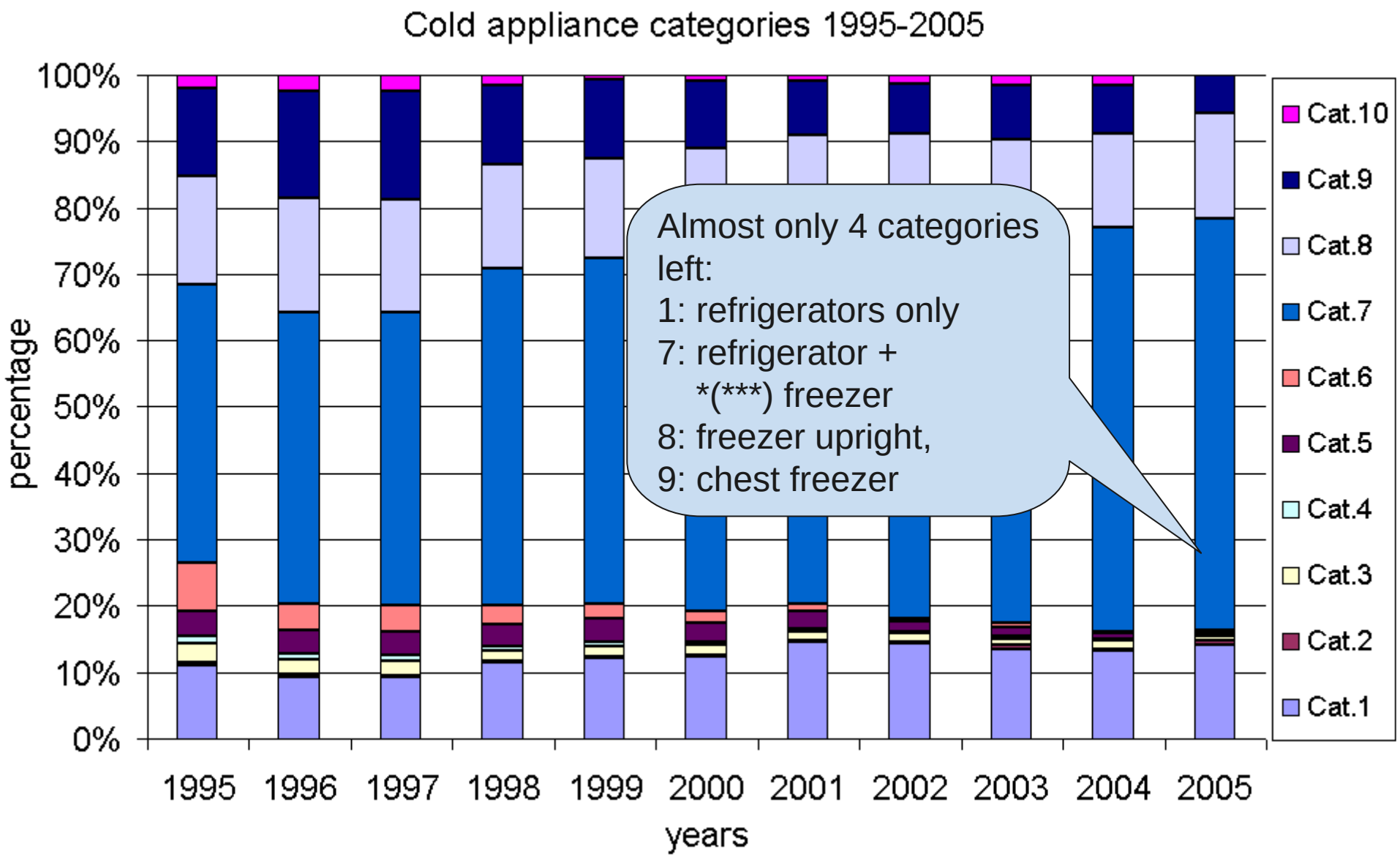
EU-coverage of consumer investigation

- 10 countries
- 250 consumers involved in doing housekeeping
- representative in age and household size
- interviewed via questionnaire
- professional online panel



Operating conditions with relevance to food storage quality

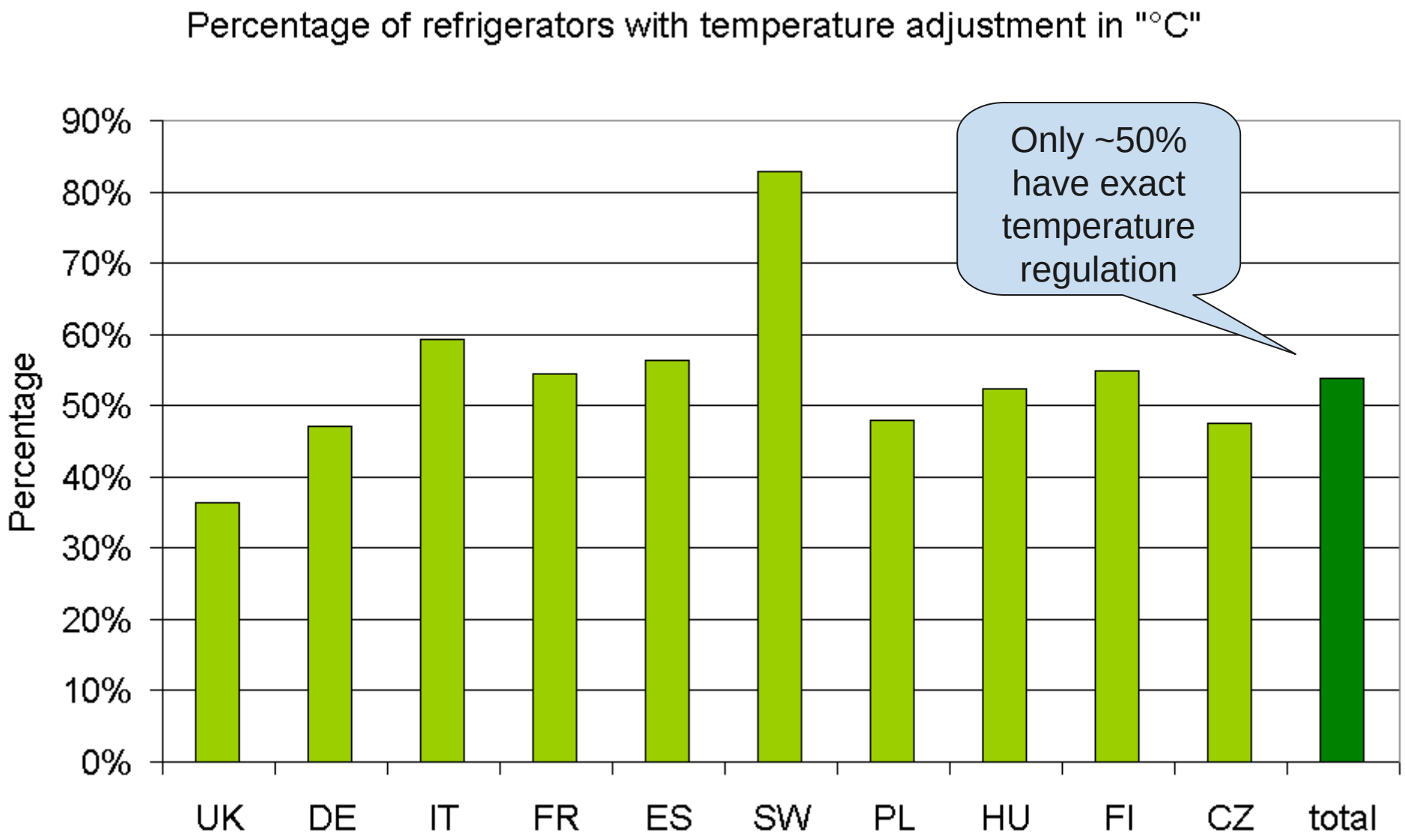
- Cold equipment used in private homes
- Operating conditions
  - Temperature setting
  - Temperature stability
  - Loading


Cold appliance categories 1995-2005
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
percentage
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
years
Cat.10
Cat.9
Cat.8
Cat.7
Cat.6
Cat.5
Cat.4
Cat.3
Cat.2
Cat.1
Almost only 4 categories left:
1: refrigerators only
7: refrigerator + *(***) freezer
8: freezer upright,
9: chest freezer

Temperature controls

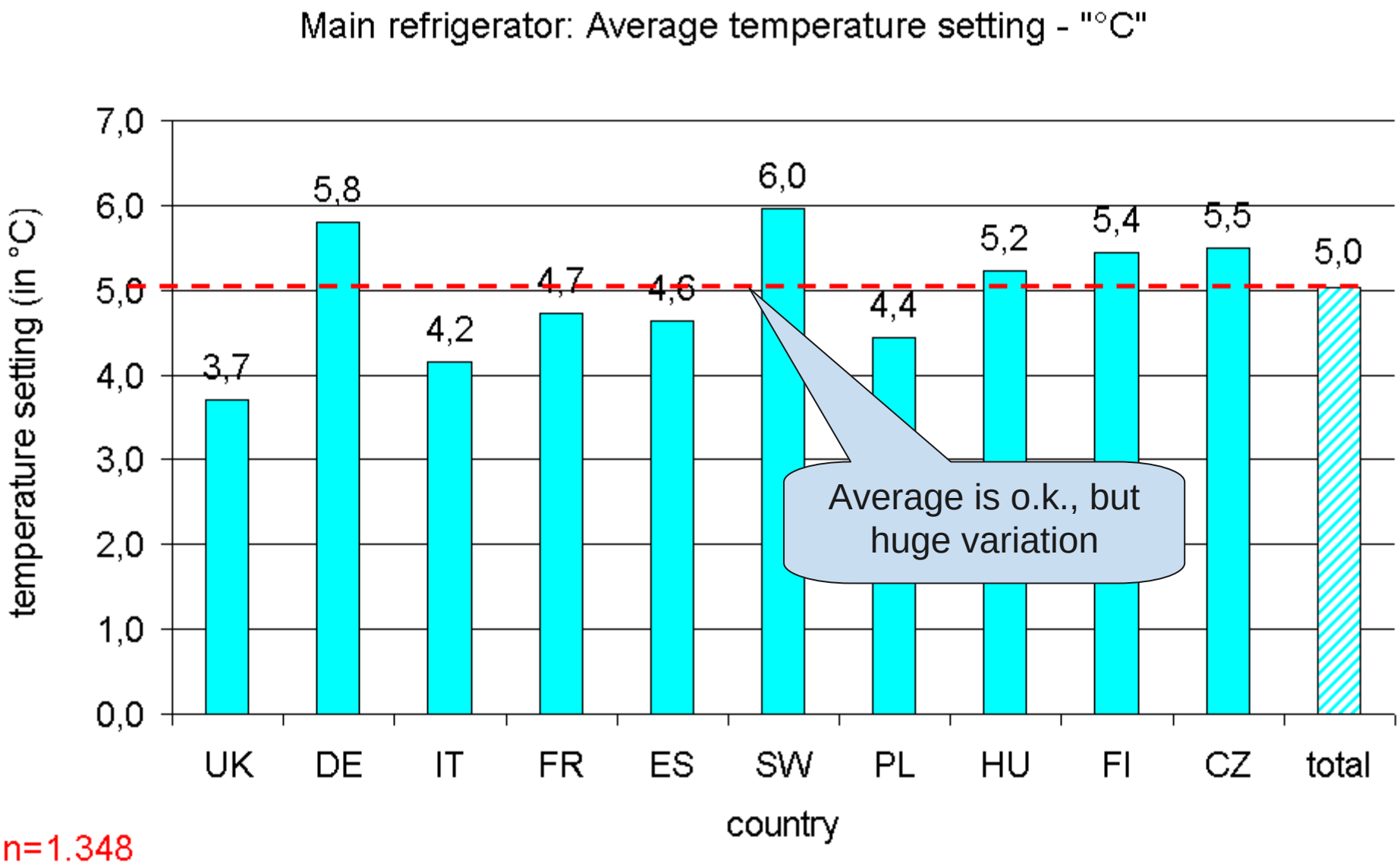
Setting

°C- control

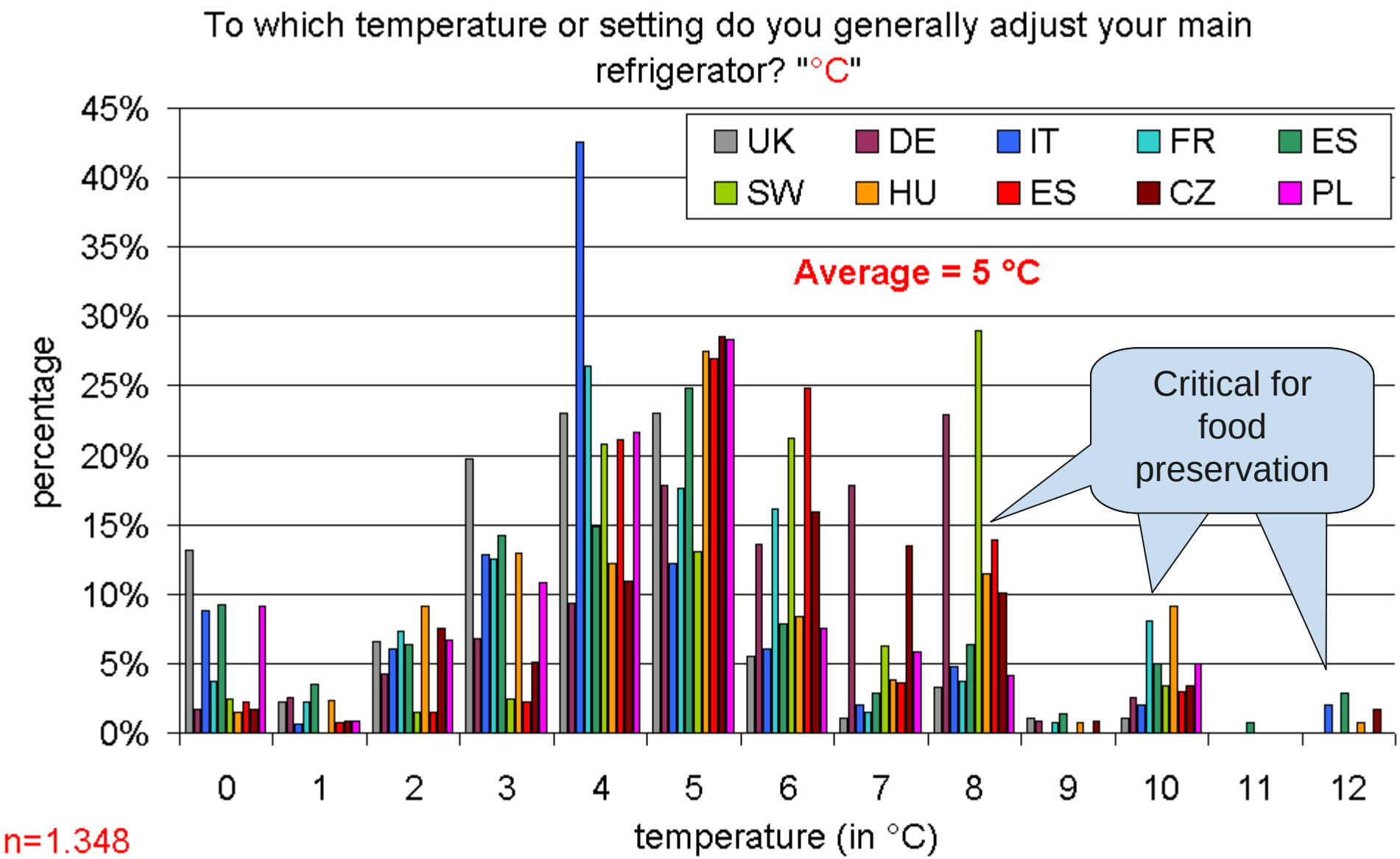

Percentage of refrigerators with temperature adjustment in "°C"
Percentage
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
UK
DE
IT
FR
ES
SW
PL
HU
FI
CZ
total
Only ~50% have exact temperature regulation

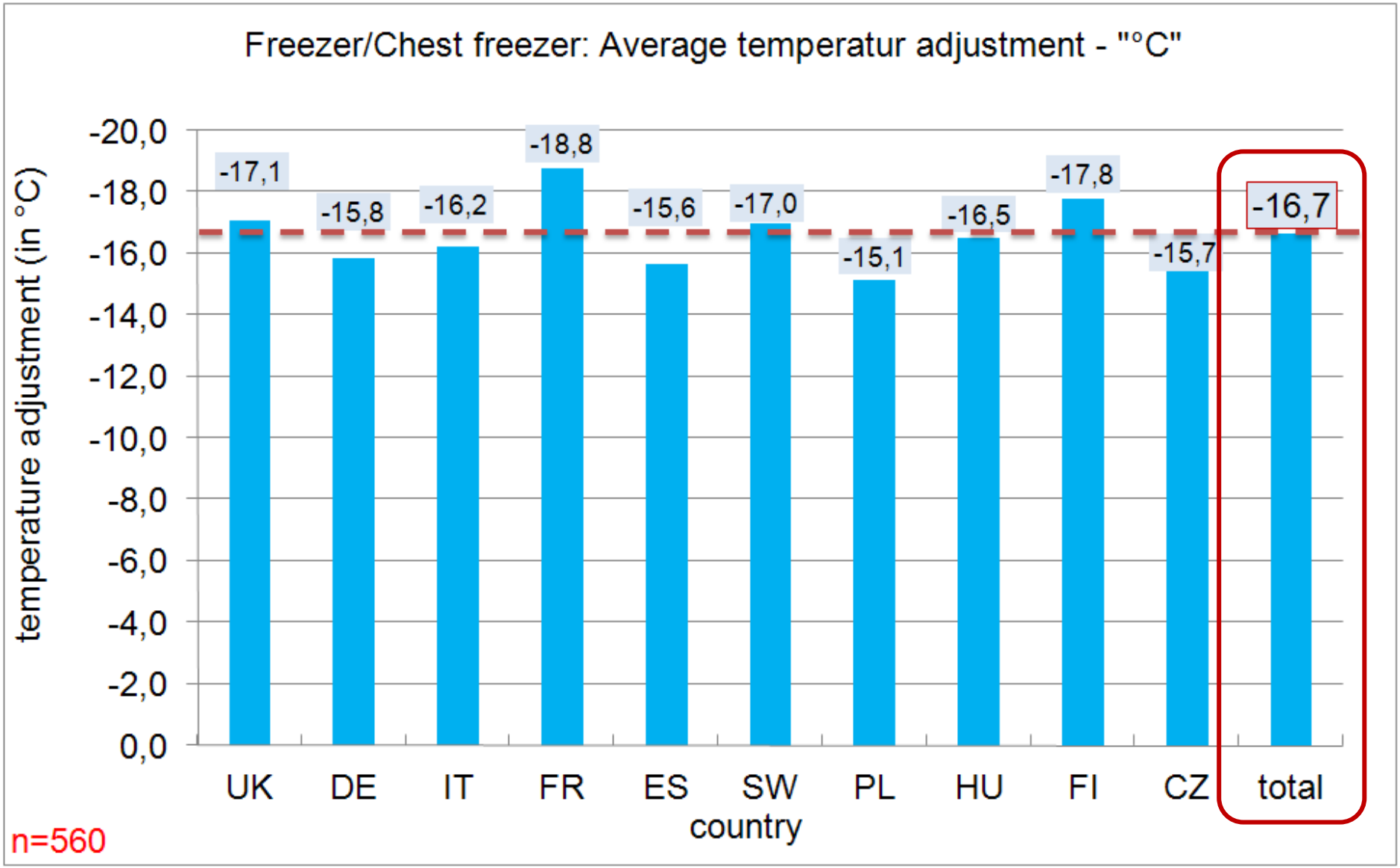
Operating conditions

- Temperature setting
- Temperature stability
- Loading behaviour and consumer preferences

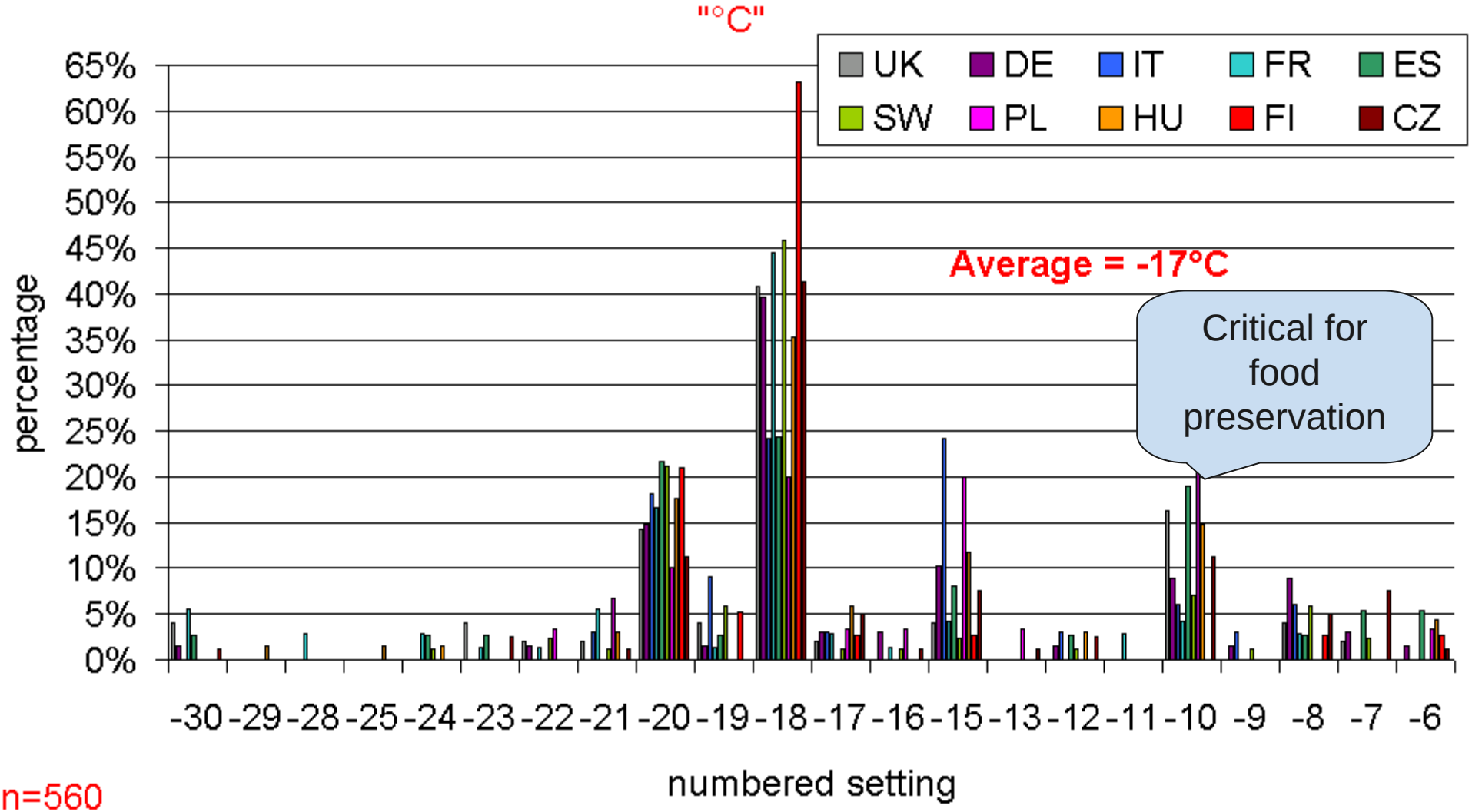

Main refrigerator: Average temperature setting - "°C"
temperature setting (in °C)
7,0
6,0
5,0
4,0
3,0
2,0
1,0
0,0
3,7
5,8
4,2
4,7
4,6
6,0
4,4
5,2
5,4
5,5
5,0
Average is o.k., but huge variation
UK
DE
IT
FR
ES
SW
PL
HU
FI
CZ
total
country

n=1.348

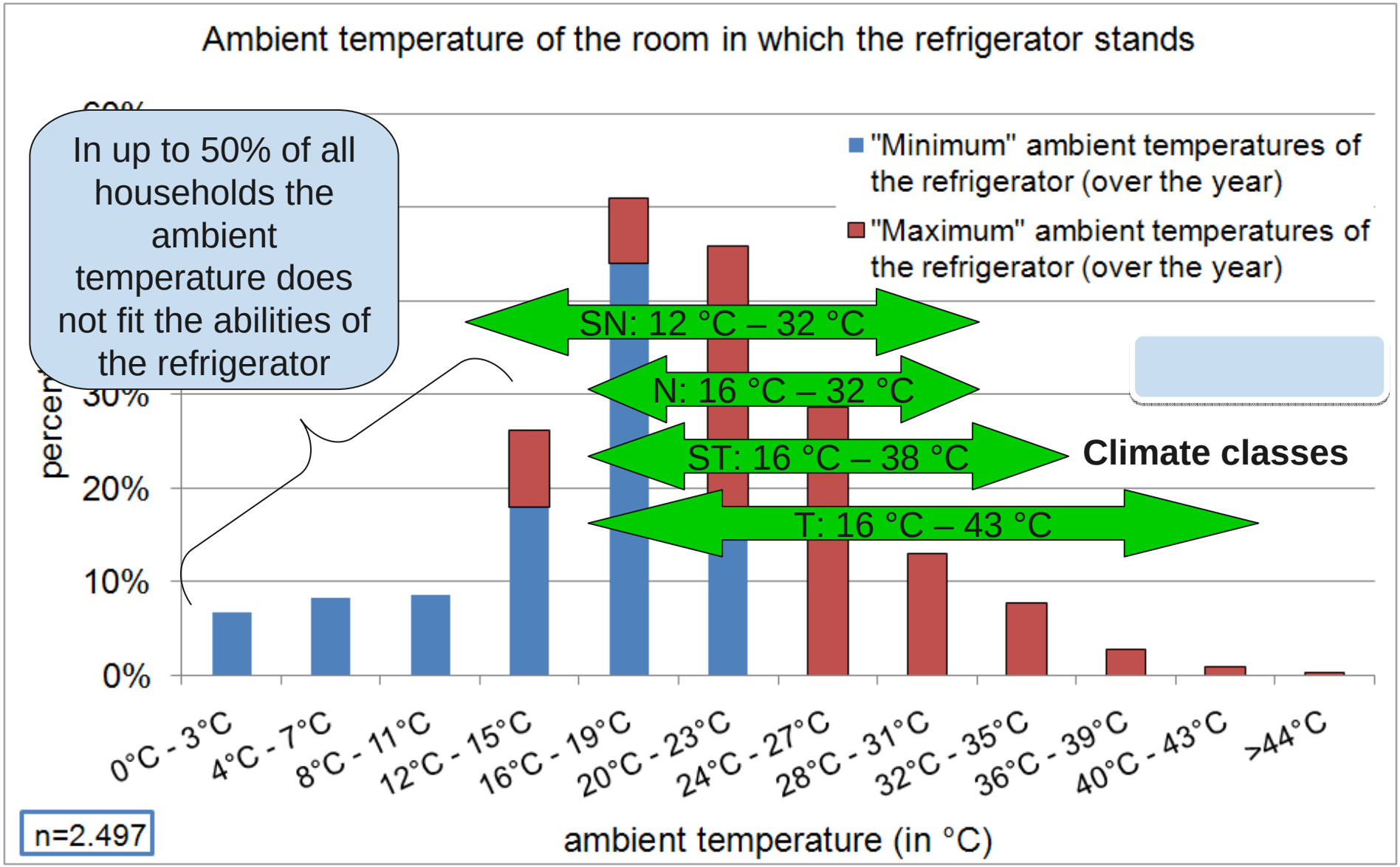

To which temperature or setting do you generally adjust your main refrigerator? "°C"
UK
DE
IT
FR
ES
SW
HU
ES
CZ
PL
Average = 5 °C
Critical for food preservation
percentage
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
0
1
2
3
4
5
6
7
8
9
10
11
12
temperature (in °C)
n=1.348


Freezer/Chest freezer: Average temperatur adjustment - "°C"
temperature adjustment (in °C)
-20,0
-18,0
-16,0
-14,0
-12,0
-10,0
-8,0
-6,0
-4,0
-2,0
0,0
-17,1
-15,8
-16,2
-18,8
-15,6
-17,0
-15,1
-16,5
-17,8
-15,7
-16,7
UK
DE
IT
FR
ES
SW
PL
HU
FI
CZ
total
country
n=560

To which setting do you generally adjust your freezer/chest freezer?

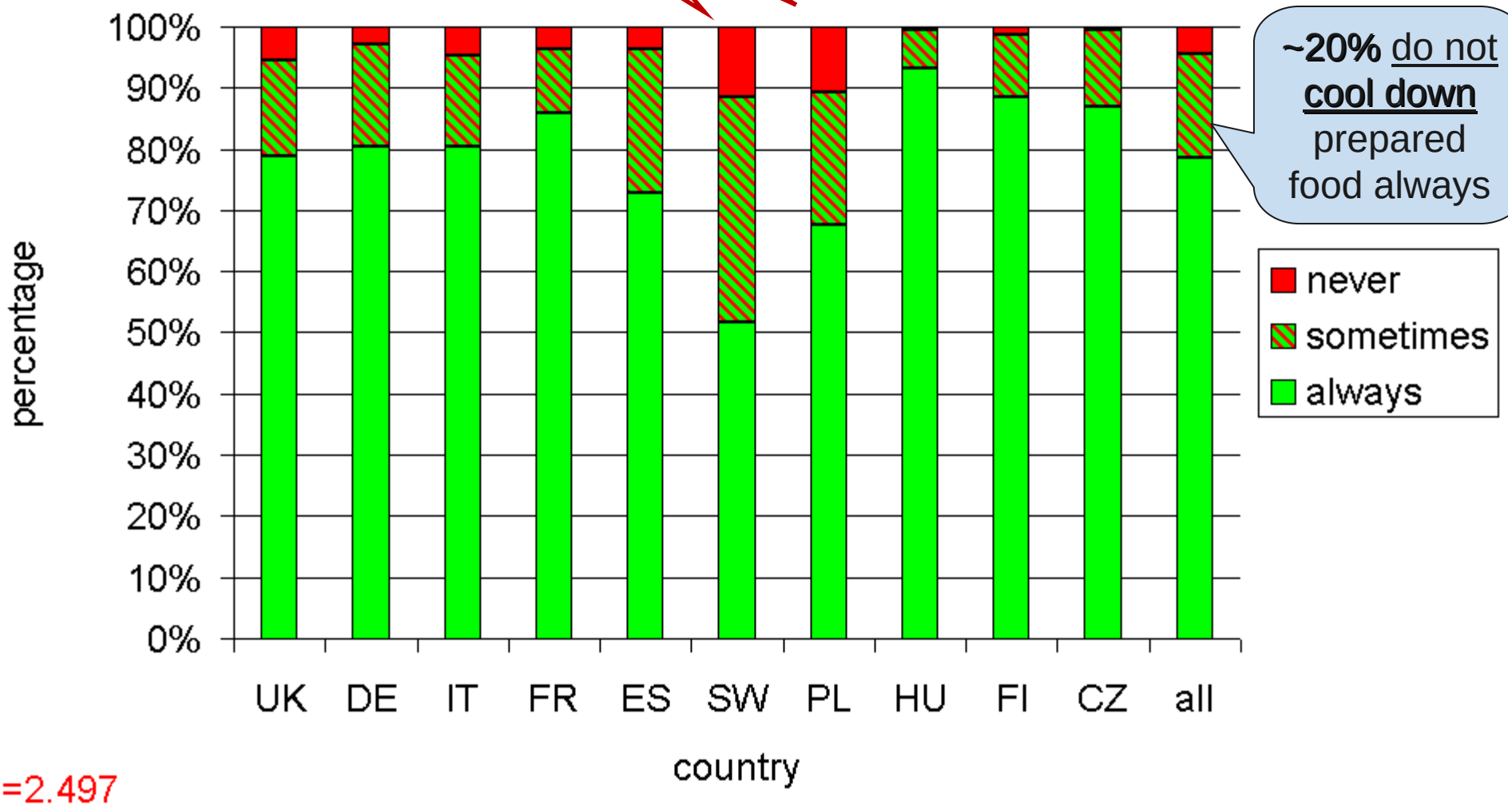


n=560


Ambient temperature of the room in which the refrigerator stands
In up to 50% of all households the ambient temperature does not fit the abilities of the refrigerator
"Minimum" ambient temperatures of the refrigerator (over the year)
"Maximum" ambient temperatures of the refrigerator (over the year)
SN: 12 °C – 32 °C
N: 16 °C – 32 °C
ST: 16 °C – 38 °C
T: 16 °C – 43 °C
Climate classes
30%
20%
10%
0%
0°C - 3°C
4°C - 7°C
8°C - 11°C
12°C - 15°C
16°C - 19°C
20°C - 23°C
24°C - 27°C
28°C - 31°C
32°C - 35°C
36°C - 39°C
40°C - 43°C
>44°C
n=2.497
ambient temperature (in °C)

~10% never cool down prepared food

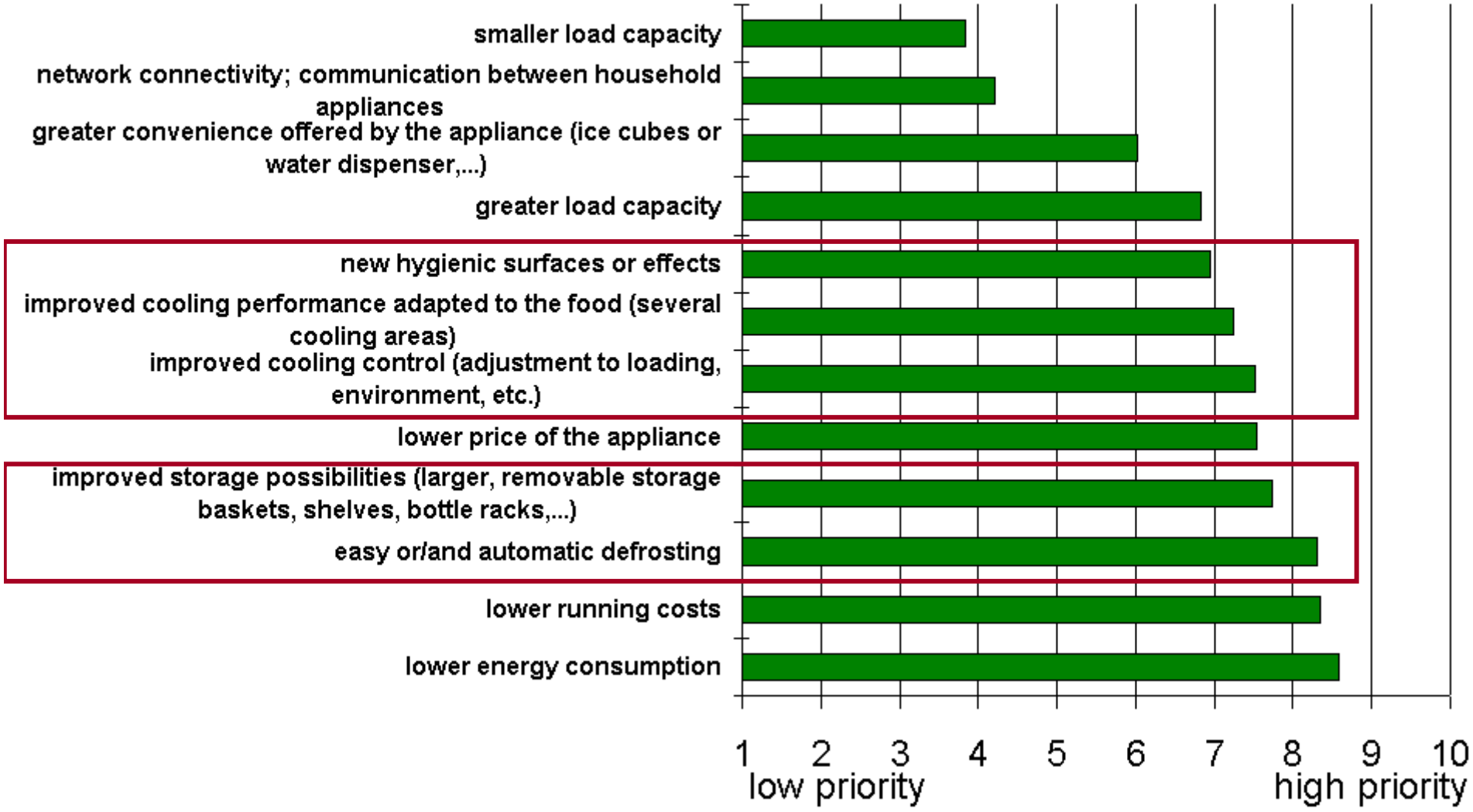
Do you cool prepared food down before you put it into the refrigerator?



~20% do not cool down prepared food always

n=2.497

Which of the following refrigerator features have what priority for you?



Summary

- Most used cold appliances are combined refrigerators/ freezers (most with just one cooling cycle for both compartments)
- Many refrigerators/ freezers are running outside of the defined ambient temperatures (climate classes)
  - In northern countries: located in heated rooms
  - In southern countries: located in unheated rooms, like balcony, garage
  - Running refrigerators/ freezers outside the climate class may overstress the capacity of the cooling cycle and cause temperature to get out of control
- Temperature setting is country dependent and up to 12 °C for refrigerators
- Only 80% of the consumers cool down things before loading them
- Consumer ask for improvements in performance and flexibility

Thank you very much!

Prof. Dr. Rainer Stamminger
University of Bonn
Household and Appliance Technology
Institute for Agricultural Engineering
Nussallee 5

D-53115 Bonn

Tel. +49 (0) 228 73 3117
Fax. +49 (0) 228 73 2596
Mobil: +49 (0) 171 55 075 48
e-mail: stamminger@uni-bonn.de
www.landtechnik.uni-bonn.de
www.haushaltstechnik.uni-bonn.de