



Objectives

- **Efficiency of nitrogen (N) use in dairy herds :**
 - environmental impacts of the N cascade
 - cost and competition on protein resources
- **Complex assessment of global N efficiency and excretion :**
 - large diversity of diets during the year
 - several animal feeding groups
- **CowNex is a free web application to assess N efficiency**

Conclusions

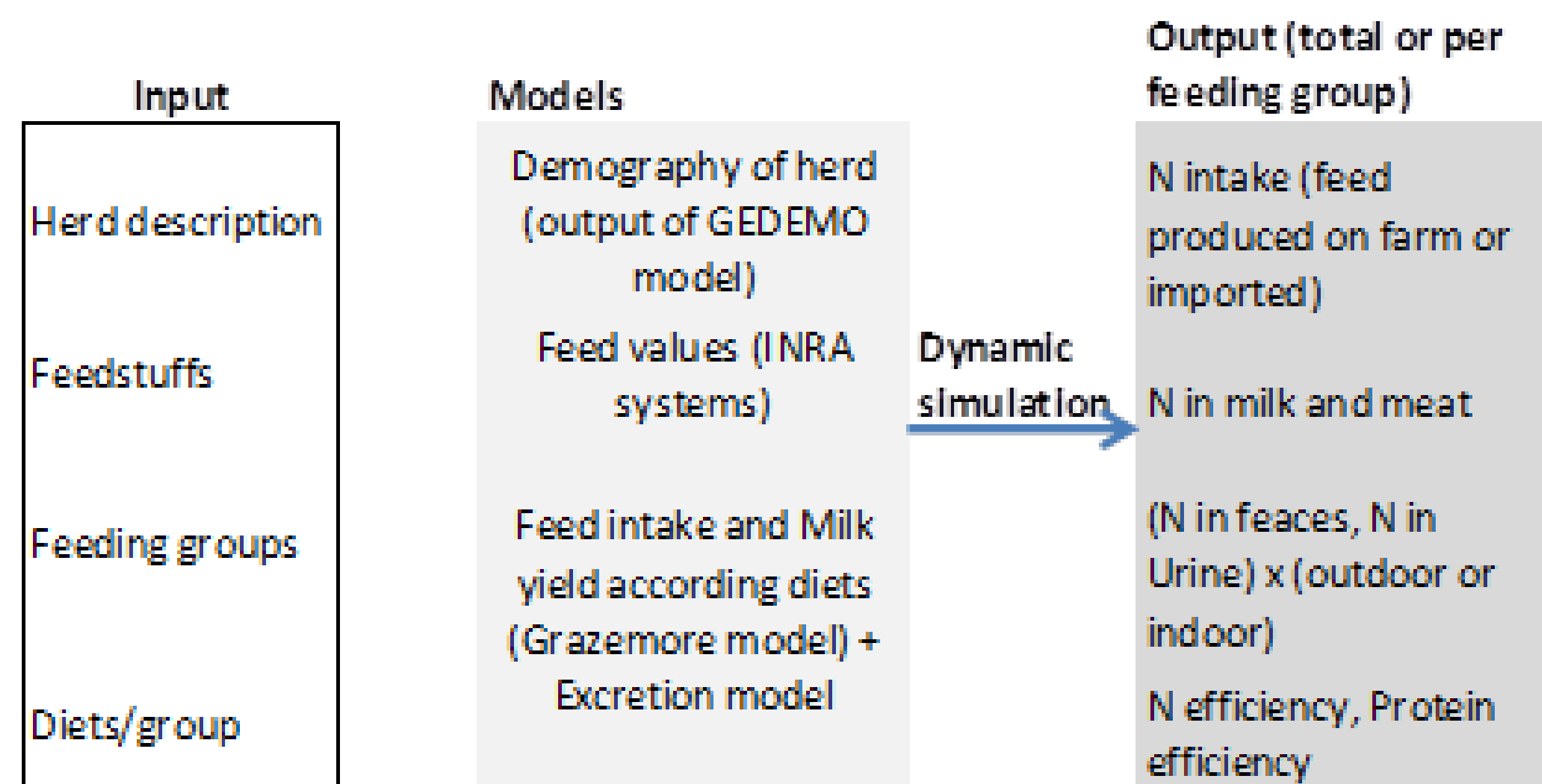
- **CowNex = simple tool to simulate ≠ dairy management**
- **A reduction of protein supplementation indoor increases N self-sufficiency and reduces NH₃ emissions of the herd**
- **NH₃ and N₂O emissions of the dairy herd increase with the duration of the indoor period**

Model and application

<http://www.cownex-record.inra.fr/>

Model of N and DM flows at herd level

A set of coupled models to simulate a dairy herd



A user friendly interface to detail feeding management

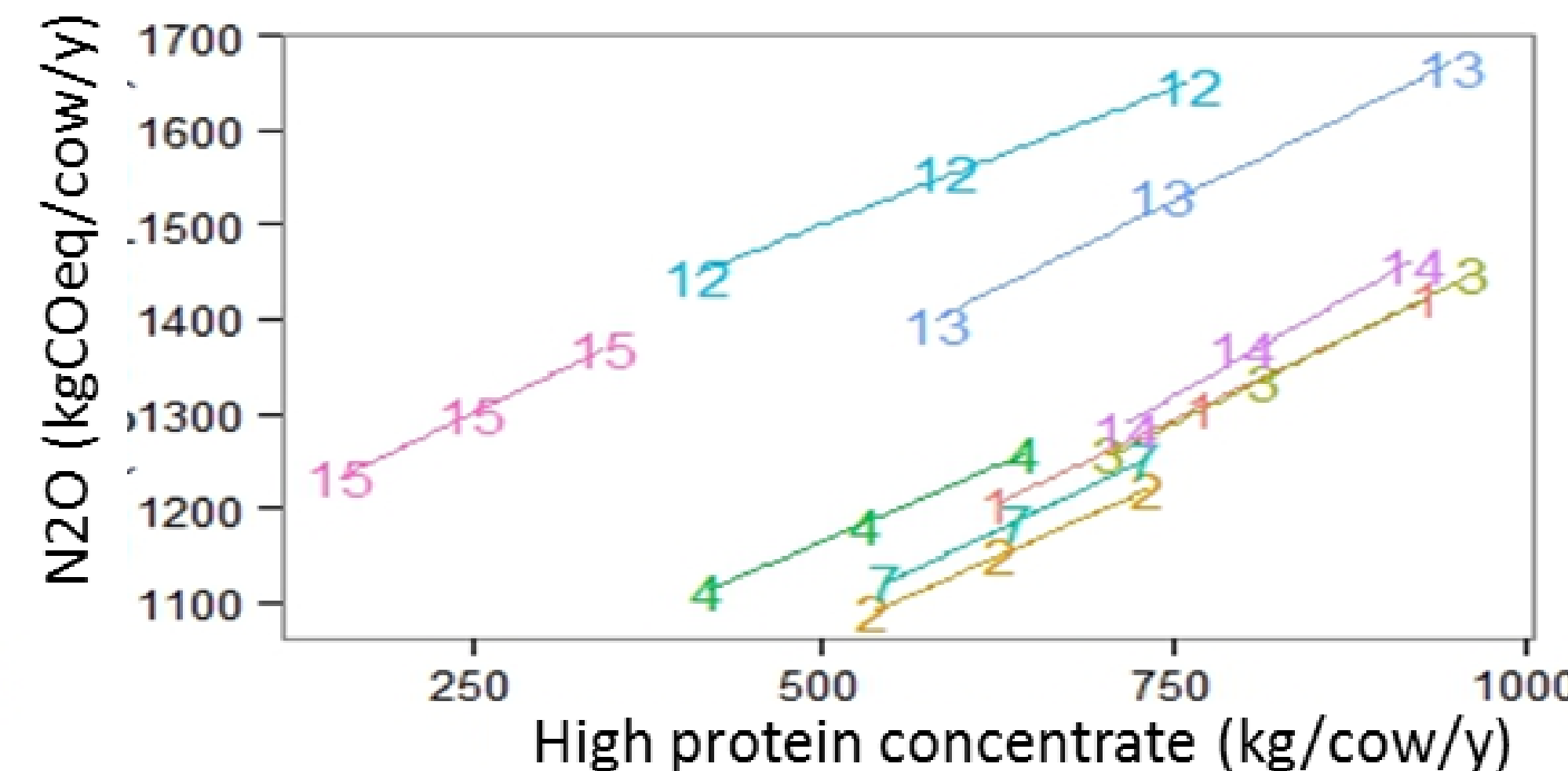
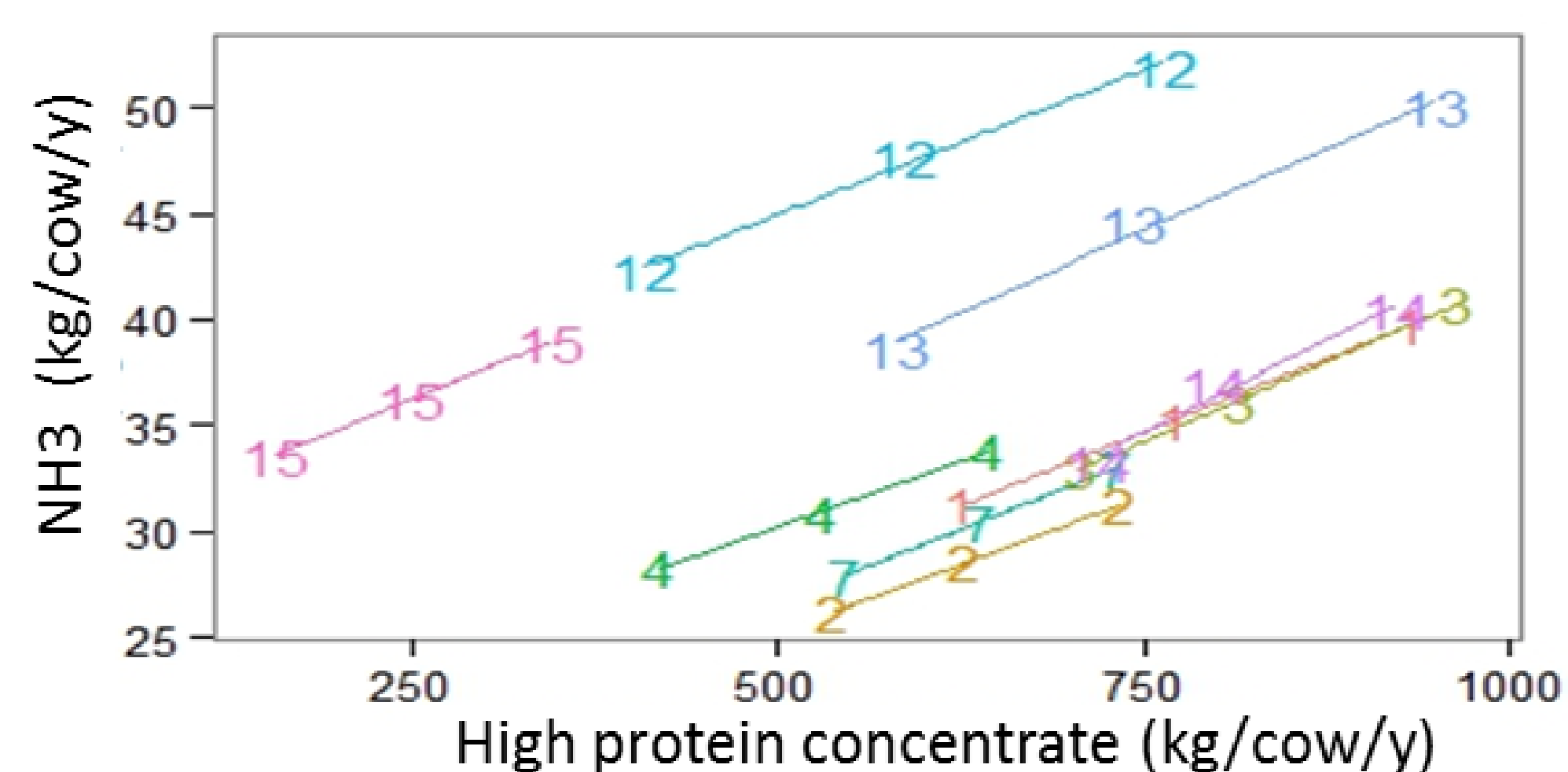
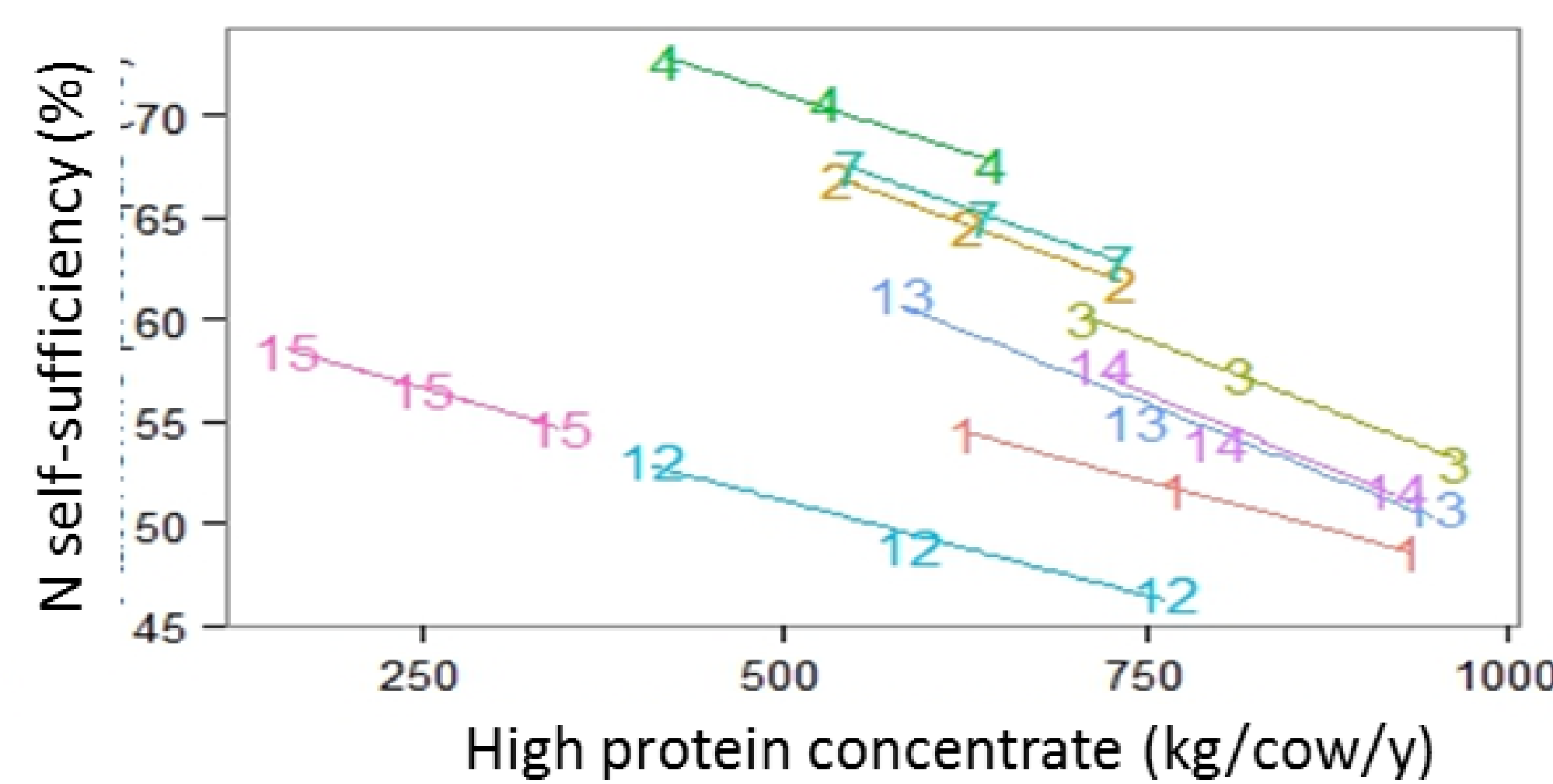
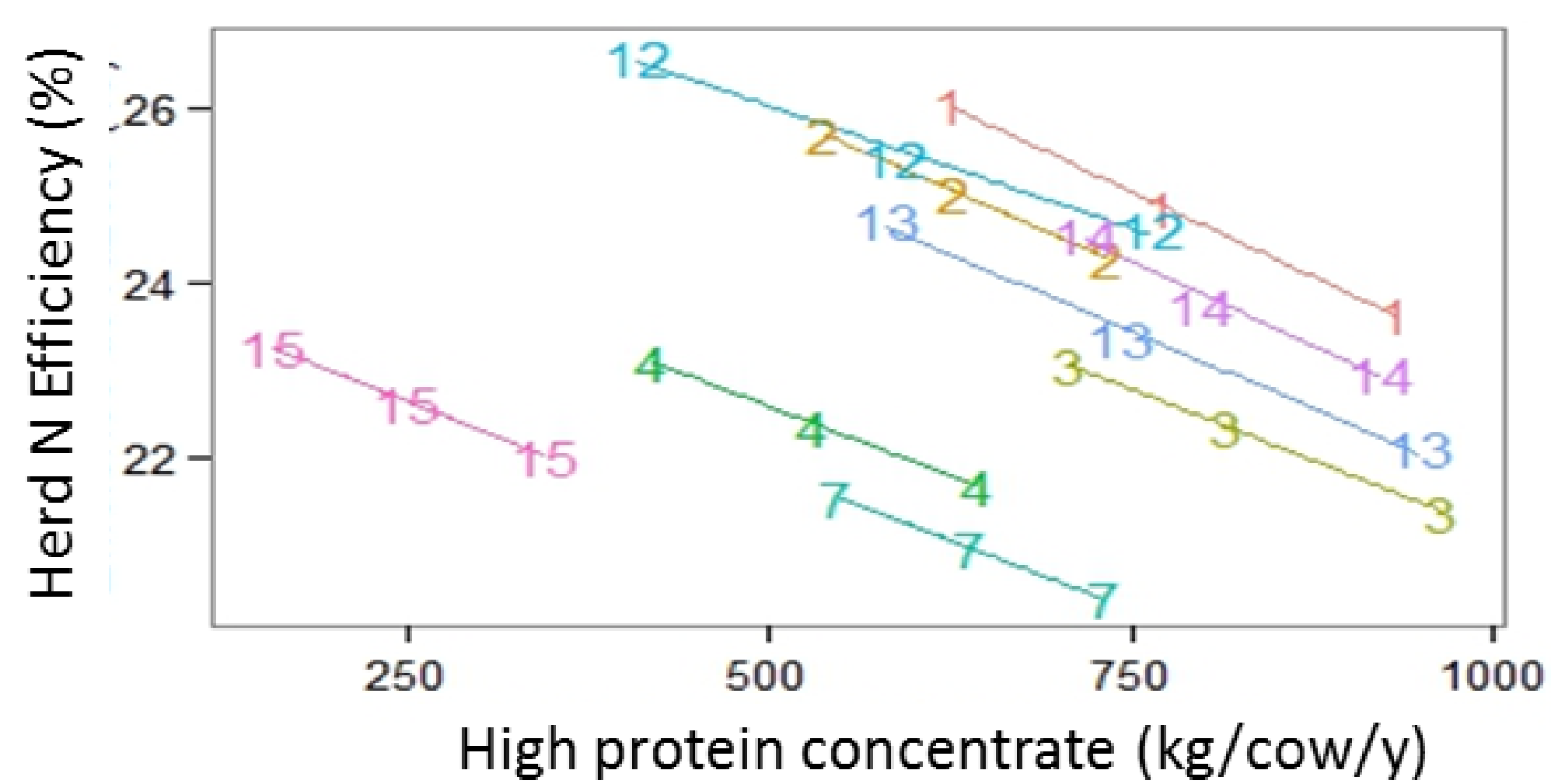
Cows-Vaches										
	Diet 1 (75 Day)		Diet 2 (60 Day)		Diet 3 (88 Day)		Diet 4 (76 Day)		Diet 5 (62 Day)	
	Begin	End	Begin	End	Begin	End	Begin	End	Begin	End
	9/1/2012	11/15/2012	11/16/2012	1/15/2013	1/16/2013	4/14/2013	4/15/2013	6/30/2013	7/1/2013	8/31/2013
	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)	(mm/jj/aaa)
	DM (kg/day)	%	DM (kg/day)	%	DM (kg/day)	%	DM (kg/day)	%	DM (kg/day)	%
FreshGrass		100						100		100
MilkP-LaitP										
MaizeS-EMais		7				65				
Straw-Paille										
SMB-Tt-Soja			1			10				
Barley-Orge	4					20	4			4
Grass Silage										
BRE										
Foin				100		5				
Total	4	100	8	100	0	100	4	100	4	100
Time outdoors (h)		20		0		0		20		20

N efficiency and N emissions³ for dairy systems with different protein supplementation indoor

³reuse of CowNex outputs in the EMEP – EAA spreadsheet to calculate N₂O and NH₃ emissions

Dairy Systems
(maize in % of forage area)

- Specialised Plain**
- 1 nW Maize > 30%
- 2 W Maize > 30%
- 3 nW Maize 10-30%
- 4 W Maize 10-30%
- Montain**
- 7 Maize
- Crop dairy**
- 12 Maizes > 30%
- Mixed Dairy**
- 13 Maize > 30%
- 14 Maize 10-30%
- 15 Maizes < 10%



⁴ Adapted from the 'observatoire de l'alimentation des vaches laitières' (IDELE, 2011)