Joint Research Centre (JRC)

Economic Analysis of Electronic Identification (EID) of Small Ruminants in Member States

G. Fiore, F. Natale, J. Hofherr

IPSC - Institute for the Protection and Security of the Citizen

Ispra - Italy

http://ipsc.jrc.ec.europa.eu/

http://www.jrc.ec.europa.eu/

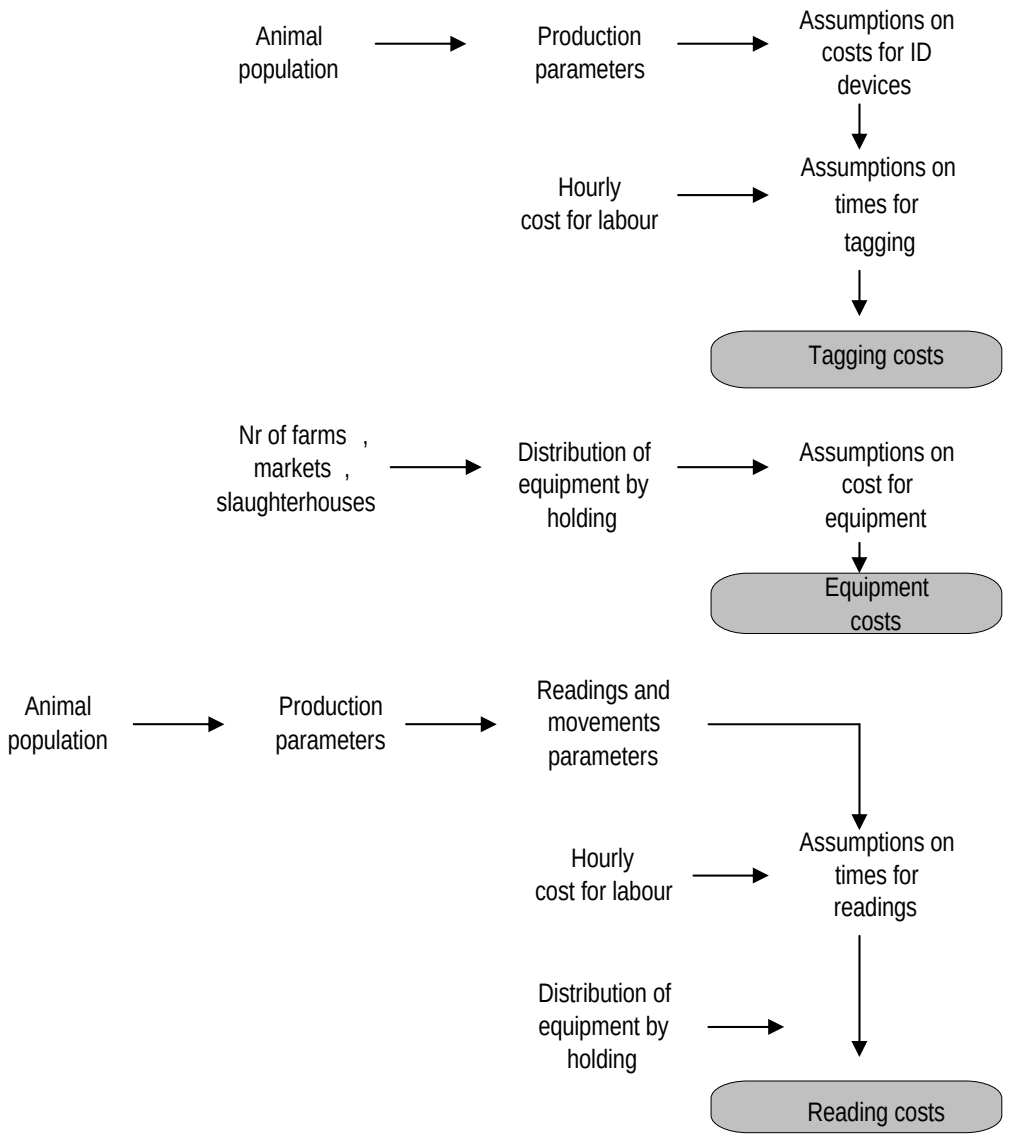
contact: johann.hofherr@jrc.ec.europa.eu

Scope and Objectives

A case study with a general model to provide

- a quantitative cost analysis of EID for national flocks
- under some production systems common in the EU
- analyzing the costs along the production chain
- for several options for the implementation

the study did not look into possible benefits, but rather on cost savings arising from the introduction of EID



Tagging/retagging

2 ear tags or ear tag + bolus, applicators,
loss rate of tags and bolus

Reading equipment

handheld, static readers, computer, printer, software for data processing

Reading for movements

including movement document and or updating herd register

Common assumptions for tagging costs

Costs for tagging / retagging equipment per animal	Price
•Standard ruminal bolus + conventional ear tag	1.30€
•Electronic ear tag + conventional ear tag	1.15€
•Double conventional individual ear tag	0.80€
•Holding ear tag for slaughter lambs	0.15€
•Applicator for ruminal boluses	0.02€
•Applicator for ear tags (electronic and conventional	0.02€

Replacement rate	
Ruminal boluses	0.1 %
Conventional or electronic ear tags	5 %

Labour times for tagging/retagging	Time (minutes)	
•Average tagging EID/CID, including recording in herd-register	1	per animal
•Average tagging HID intended for slaughter <12 months	0.5	per animal
•Average retagging for a EID/CID additional handling for verification and cross reference in herd-register	1.5	per animal

EID = electronic identification (ruminal bolus or electronic ear tag)
CID = conventional identification with country code + 12 individual digit code
HID = conventional identification with country code + code of holding of birth

Common assumptions for reading costs

Reading equipment	Price	Annual depreciation over 3 years	Annual cost for maintenance and training
•Simple handheld reader	500€	167€	75€
•Sophisticated handheld reader	2,000€	667€	300€
•Static reader	1,500€	500€	225€
•Installation costs for readers in markets, abattoirs (depreciation over 10 years)	8,000€	800€	
•Computer, software, printer	900€	300€	90€

Distribution of devices (e.g. UK)	> 500 heads	≤ 500 heads	≤ 100 heads	Markets Big	Markets Small	Slaughterh. Big	Slaughterh. Small
Handheld reader - simple	1	1	0	2	1	2	1
- more sophist.	0	0	0	2	1	2	1
Static reader	0.5	0	0	2	0	1	0
Computer	0.5	0.5	0	0	0	0	0

Common assumptions for reading costs

Labour times for reading	Time (minutes)	
Average cost for EID hand readings including recordings in register and movement document	0.2	per animal
Average cost for EID static readings including recording in register and movement document	3	per 100 animals
Average cost for conventional reading of 15-digit ID (read and write down on movement document and register)	1.25	per animal
Average cost for reading HID, recording in register and issuing movement document	0.25	per animal

Small Ruminant Population in the EU

	Total number of animals (1000 heads)	% sheep	% goats
United Kingdom	35,415	100%	0%
Spain	22,136	89%	11%
Greece	15,067	67%	33%
France	9,755	87%	13%
Romania	9,406	91%	9%
Italy	7,727	88%	12%
Ireland	5,355	100%	0%
Portugal	2,729	86%	14%
Germany	2,461	100%	no data
Netherlands	1,995	77%	23%
Bulgaria	1,949	74%	26%
Hungary	1,299	95%	5%
Cyprus	525	46%	54%
Sweden	513	99%	1%
Poland	480	70%	30%
Austria	386	85%	15%
Slovakia	360	97%	3%
Czech Republic	187	92%	8%
Belgium	179	84%	16%
Denmark	171	92%	8%
Slovenia	166	79%	21%
Finland	124	96%	4%
Latvia	88	80%	20%
Estonia	87	95%	5%
Lithuania	81	65%	35%
Malta	14	61%	39%
Luxembourg	7	94%	6%
EU 27	**118,663**	**89%**	**11%**

Selection criteria for case study:

- *Size of national flock*
- *Production types*
  (e.g. meat, hobby)
- *Holding size*
  (distribution in small, medium and large holdings)

Source:
information from Member States and EUROSTAT 2005/2007

4 Member States with very differently structured small ruminant flocks (production/movement patterns)

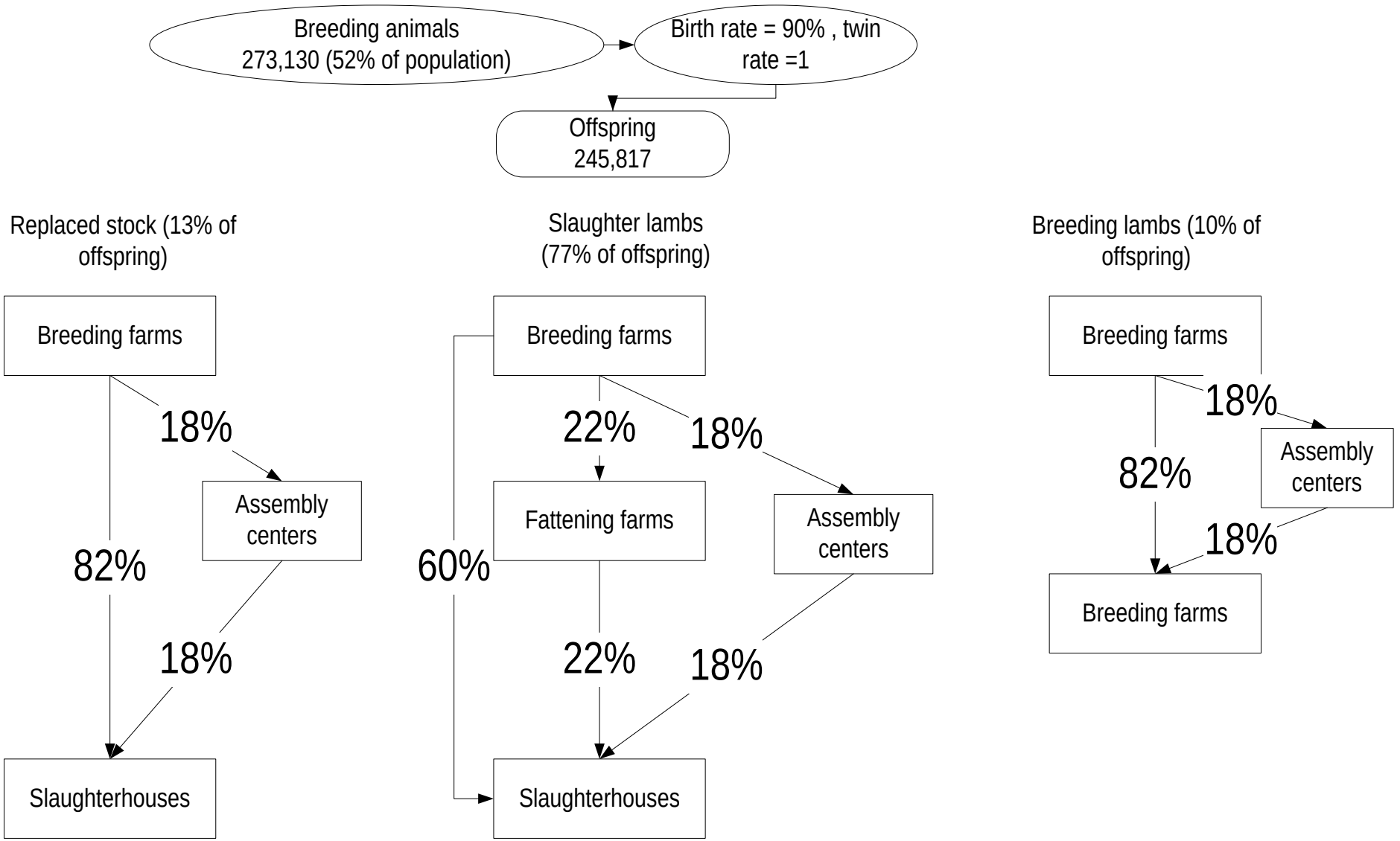
1. Cyprus (small national flock, sheep/goats ~ 46/54%, few movements, bolus),

2. Spain (large national flock, more than 60% larger holdings, few movements, short production chain, bolus),

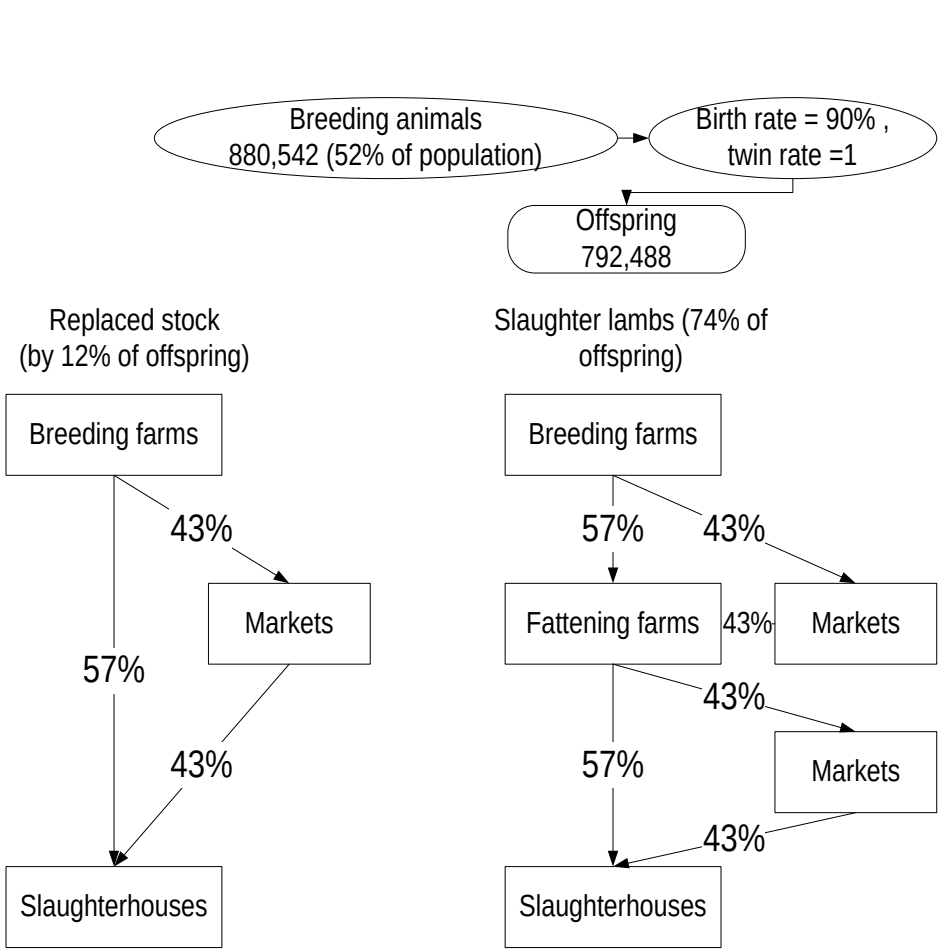
3. the Netherlands (small national flock, many hobby keepers, some more movements, bolus / ear tag),

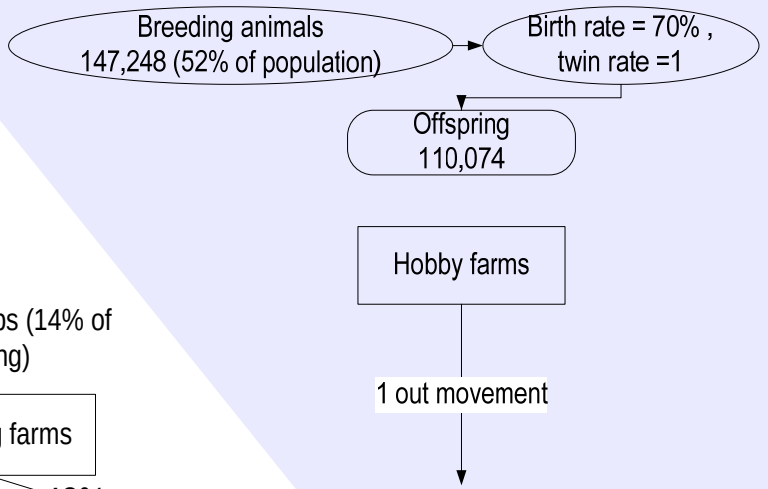
4. the United Kingdom (only sheep, nearly 80% larger holdings, meat production, many movements, mainly through markets, ear tag)

The model could be applied to any other Member State


Breeding animals
273,130 (52% of population)
Birth rate = 90% , twin rate =1
Offspring
245,817
Replaced stock (13% of offspring)
Breeding farms
18%
Assembly centers
82%
18%
Slaughterhouses
Slaughter lambs (77% of offspring)
Breeding farms
22%
18%
Fattening farms
Assembly centers
60%
22%
18%
Slaughterhouses
Breeding lambs (10% of offspring)
Breeding farms
18%
Assembly centers
82%
18%
Breeding farms

Netherlands (production / movement pattern)

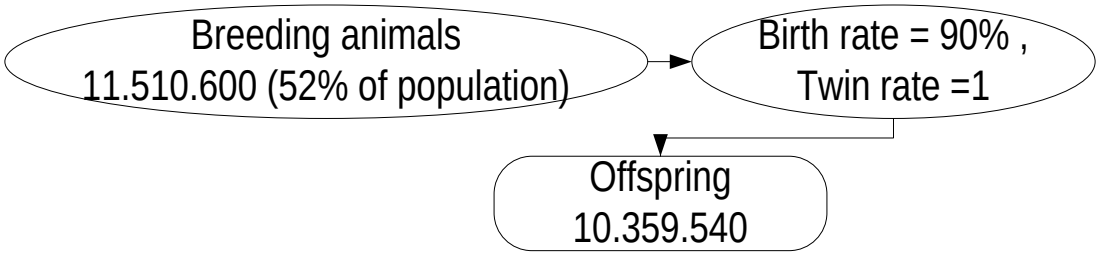




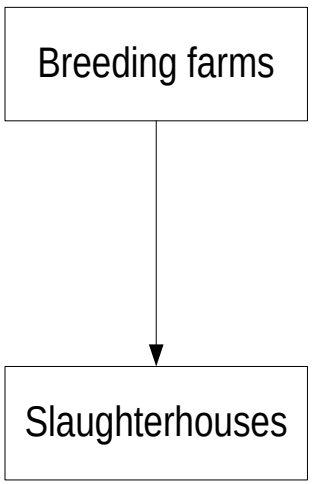
Commercial farming

Hobby holdings

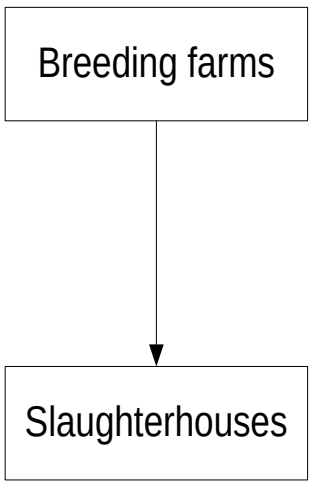
Spain (production / movement patterns)



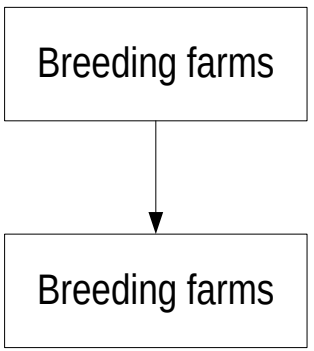
Replaced stock (10% of offspring)

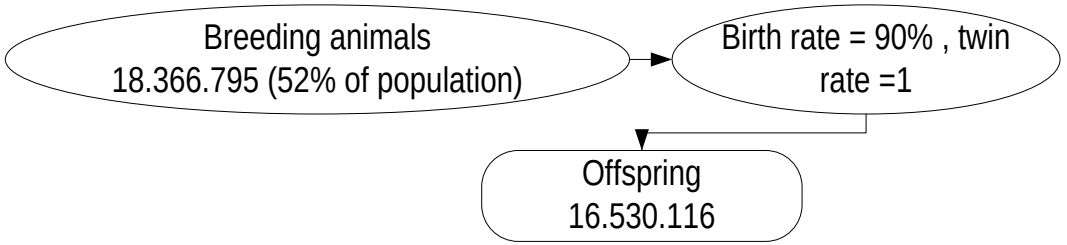


Slaughter lambs (85% of offspring)

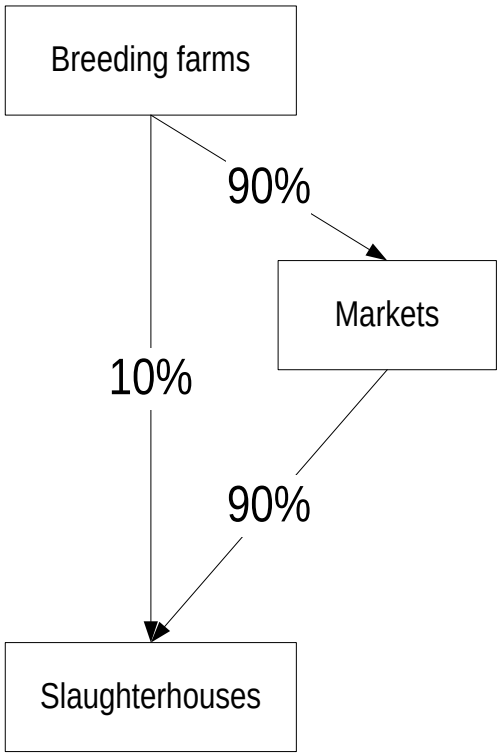


Breeding lambs (5% of offspring)

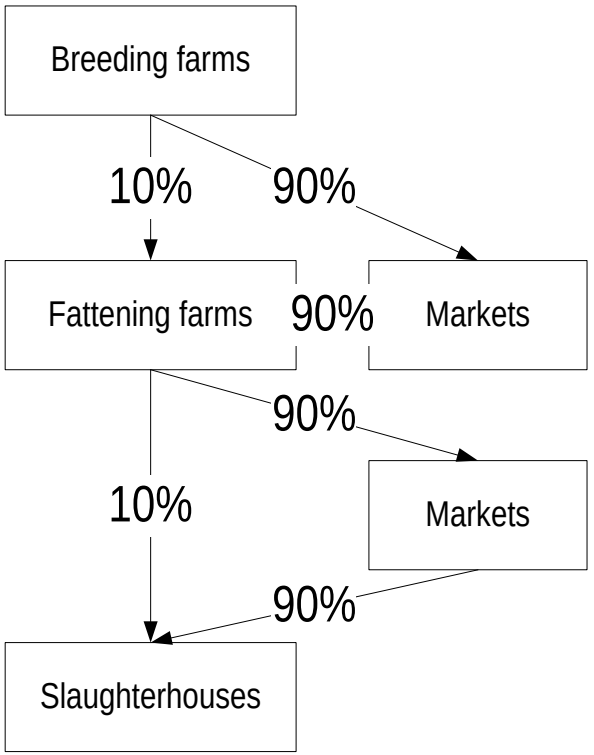




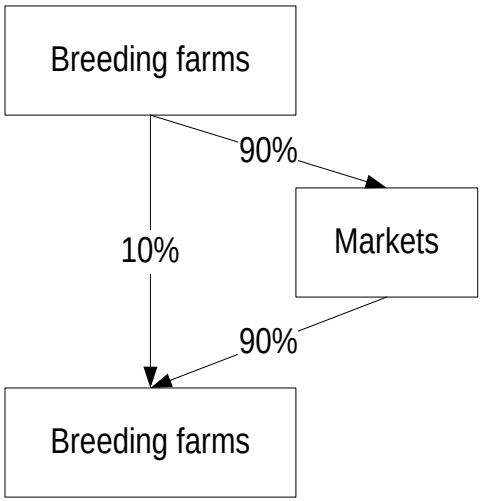
Replaced stock (10% of offspring)



Slaughter lambs (80% of offspring)



Breeding lambs (10% of offspring)



What options for implementation?

A) **Full implementation**: EID for all animals born after 31.12.2009, including slaughter lambs;

B) **Slaughter lamb derogation**: as option A, but with the exception of animals intended for slaughter before the age of 12 months;

C) **Full implementation without readings on farm**: as option A, however, reading of individual EID identified animals delegated to a control point when moved from a holding or to a holding (off- and on-farm movements);

D) **Full implementation, including also the historic flock**: as option A, but identifying in addition all animals born before 31.12.2009 with EID (the costs for EID of the historic flock occur only once!);

E) **Full implementation, including also the historic flock, without readings on farm**: as option D; however, reading of individual electronically identified animals delegated to a control point;

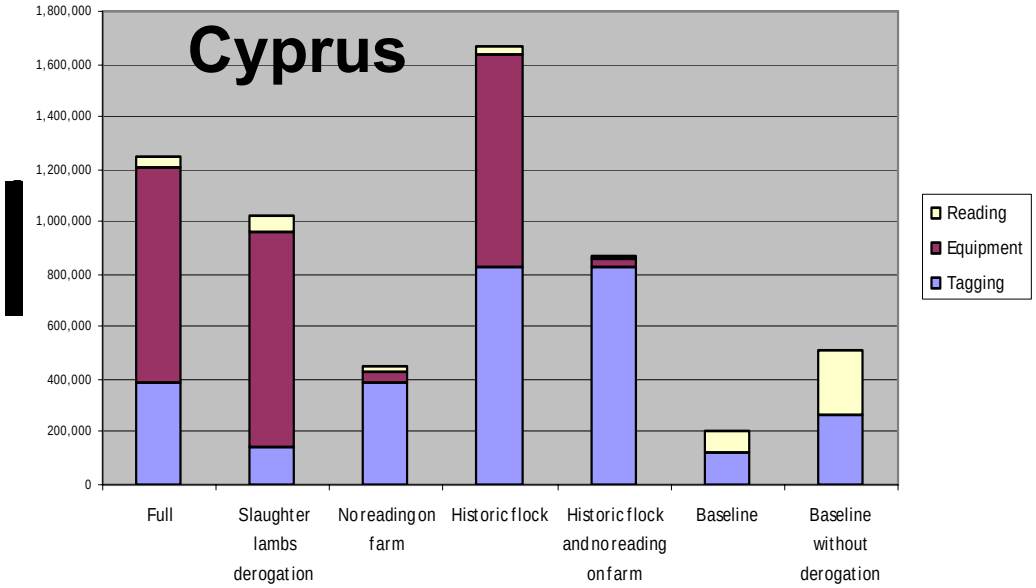
Baseline: For comparison, costs for identification with 2 conventional ear tags with individual alphanumeric code and manual reading of animals related to movements as applicable only before 1.1.2010, with and without slaughter lamb derogation.

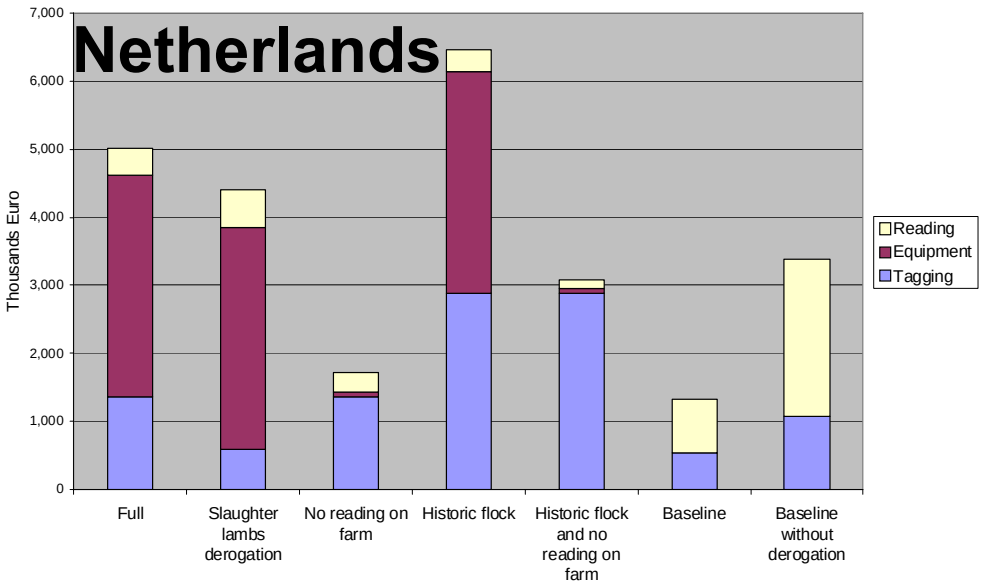
Cost distribution along production chain

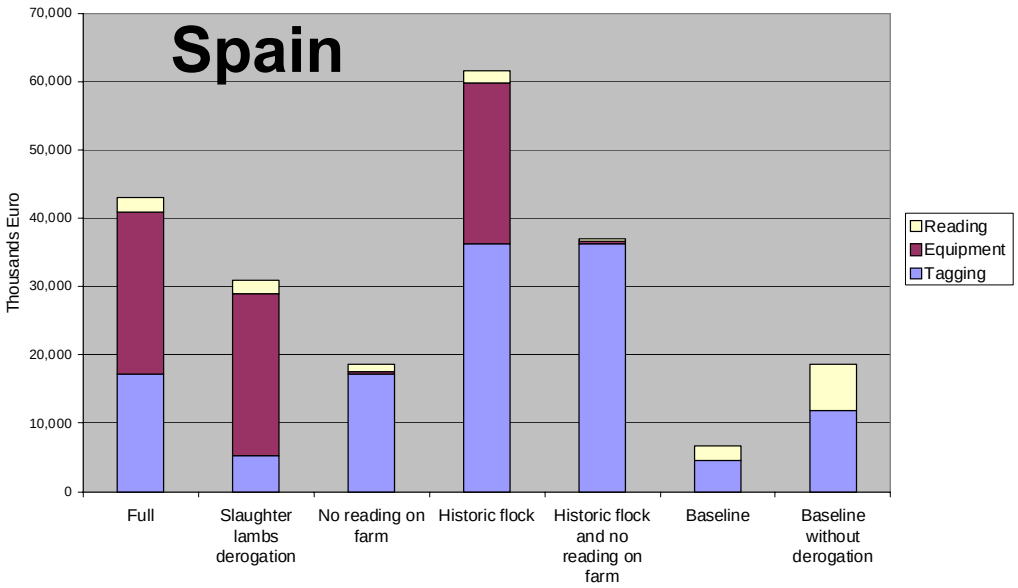
Annual costs	Cyprus	Netherlands	Spain	United Kingdom
Option A: full implementation of EID in 2010, full reading from 2011 on	**1.2 Mio €** with ruminal boluses	**5.3 Mio €** with electronic ear tags	**43 Mio €** with ruminal boluses	**73 Mio €** with electronic ear tags
Distribution per activity (in %)				
Reading equipment	65%	62%	55%	49%
Tagging	31%	29%	40%	38%
Reading	4%	9%	5%	13%
Distribution per actors (in %)				
Farm holdings	95%	94%	97%	92%
Markets/assembly centres	3%	3%	--	5%
Slaughterhouses	2%	3%	3%	3%

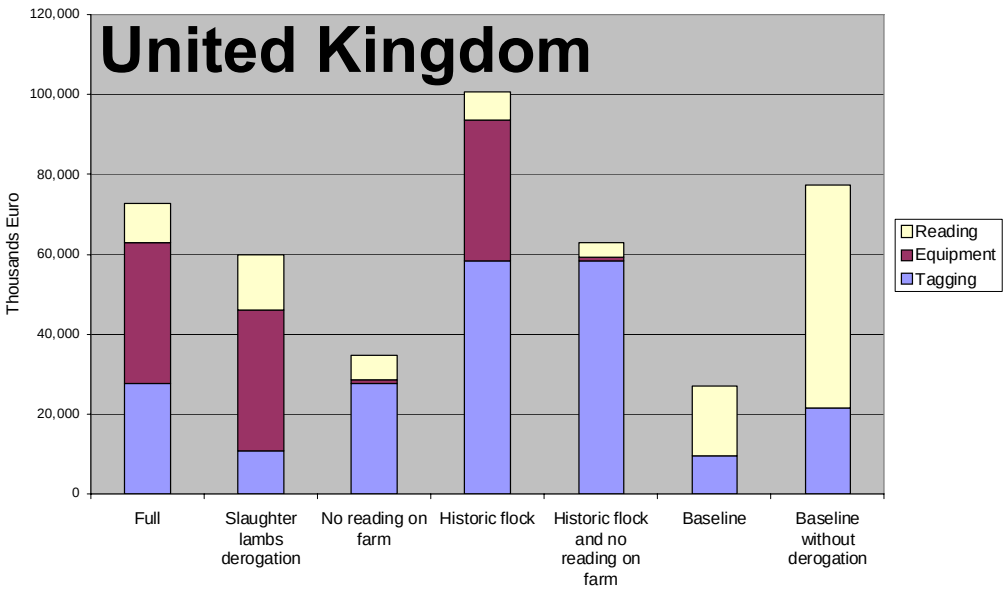
Cost of the other options

	Cyprus	Netherlands	Spain	United Kingdom
Option A: full implementation of EID in 2010, full reading from 2011 on	**1.2 Mio €** with ruminal boluses	**5.3 Mio €** with electronic ear tags	**43 Mio €** with ruminal boluses	**73 Mio €** with electronic ear tags
Cost savings with other options compared to option A (in %)				
Option C: no EID reading on farm	-64%	-66%	-57%	-52%
Option E: including historic flock, no EID reading on farm	-30%	-39%	-14%	-13%
Option B: slaughter derogation	-18%	-12%	-28%	-18%
Option D: including historic flock	+34%	+29%	+43%	+39%


Cyprus
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Full
Slaughter lambs derogation
No reading on farm
Historic flock
Historic flock and no reading on farm
Baseline
Baseline without derogation
Reading
Equipment
Tagging


Netherlands
Thousands Euro
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Full
Slaughter lambs derogation
No reading on farm
Historic flock
Historic flock and no reading on farm
Baseline
Baseline without derogation
Reading
Equipment
Tagging


Spain
Thousands Euro
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Full
Slaughter lambs derogation
No reading on farm
Historic flock
Historic flock and no reading on farm
Baseline
Baseline without derogation
Reading
Equipment
Tagging


United Kingdom
Thousands Euro
120,000
100,000
80,000
60,000
40,000
20,000
0
Full
Slaughter lambs derogation
No reading on farm
Historic flock
Historic flock and no reading on farm
Baseline
Baseline without derogation
Reading
Equipment
Tagging

Individual identification best with EID

- For MS with mainly large holdings and where animals are moved frequently, full EID is less expensive as full individual conventional identification;

- For MS with only few movements, EID is more expensive as conventional identification, but would allow for
  - less reading/writing errors
  - improved traceability
  - together with notification of individual movements to the central database, the up-to-date herd register and the movement document could become optional

Conclusions – full implementation

Reading equipment is the most expensive part

- 49-65% for reading equipment
- 29-40% for tagging
- 4-13% for reading

Costs are not equally distributed along the chain

- 92-97% at farm holdings
- 3-8% at markets, assembly centers and slaughterhouses

Costs could be substantially reduced, esp. for farmers

- 52-66% cost savings with full implementation without weakening traceability when EID is read only at control points (markets, assembly centers, slaughterhouses, etc.)
- 13-39% cost savings for full implementation + historic flock, when EID is read at control points
- 12-28% cost savings when applying slaughter derogation but with weakening traceability

Costs and benefits for different actors

Stakeholders involved	Options	Equipment costs	Tagging/retagging costs	Reading costs	Advantages from EID
Farm holdings	A	+++	++	+	
	B	+++	+	++	
	C		++		√√
	D	+++	+++	++	
	E		+++		√
Markets	A	+++	--	++	√√
	B	+++	--	+++	
	C	+++	--	++	√√
	D	+++	--	+	√√√√
	E	+++	--	+	√√√√
Slaughterhouses	A	+++	--	++	√
	B	+++	--	+++	
	C	+++	--	++	√
	D	+++	--	+	√√√
	E	+++	--	+	√√√
Government/ official control bodies	A	+	--		√√
	B	+	--		√
	C	+	--		√√
	D	+	--		√√√
	E	+	--		√√√

Contacts:

JRC/IPSC
CI - Animals
& Food

TP 361
Via E. Fermi 2749
21027 Ispra (VA)
Italy

JRC website on EID

http://eid.jrc.ec.europa.eu/