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Outputs and economic assessment of RFID technology and molecular biology (STRs) as innovative tools for traceability and origin protection in "Suinetto di Sardegna"

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Map of Europe, *"Theatrum Orbis Terrarum"* by Abraham Ortelius. Anversa, 1570

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- Limited production within the pork meat chain in Sardinia, known as "Su porcheddu arrustiu o porcheddu a ispidu"

- Pork production is represented by a "scattered filiere" (9,17% of national husbandry, ISTAT 2007)

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• Small family run farms (9.264, ANAS 2007 spread all over the Isle, leading to a highly appreciated limited production

Suckling piglets are normall slaughtered around one mont of age: whole or half carcasses ar the usual ways the produc is presented at retailer

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- Potentials of such production may lead the suckling piglet meat to achieve "a niche" within the market

- Reinforcement of the "brand" of the pork product, through a sound traceability system

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Previous trial on deployment of the RFID technology fo piglets identification and traceability of animals and RFID + DNA for animal products traceability

ON FIELD PERFORMANCE	TECHNICAL CHARACTERISTICS	COSTS OF TRACEABILITY?
• Ease activities	• Univocable and clear	
• Reduce errors	• Repeatedly constant	Fill the blank
• Reliable	• Fraud proof	
• Easy to share	• Carrier of information	
• Grant information flow		

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ANIMALS:
355 suckling piglets were electronically identified (EID), within the first week of birth in field, by intraperitoneal injection of a transponder (*Caja* et al., *2003*)

DEVICE:
Passive HDX transponder
32.5 3.8 mm,
ISO 11784-11785 Tiris 32 mm

READERS:
RFID handy reader (Gesreader 2S ISO®, static reading)

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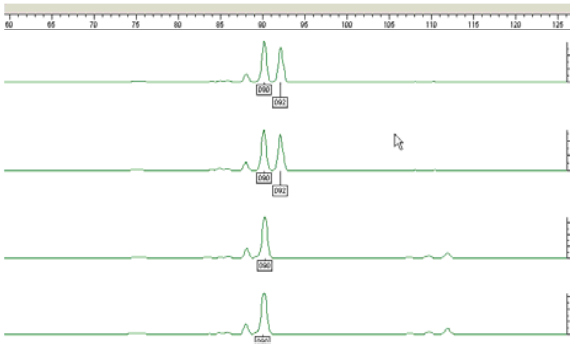
Reading of individual transponder code and R%:
Controls of transponder code and calculation of readability in farm and at abottoir

DNA analysis:
DNA extraction from tissue sample from EID piglet at farm and from correspondent EID carcass for PCR by means of 6 microsatellites for Swine according to FAO panel



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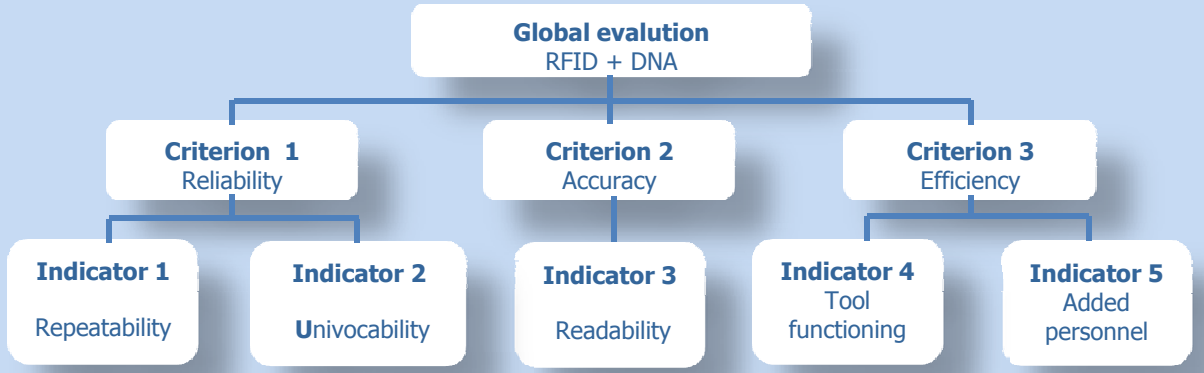
Evaluation of RFID+DNA as an integrated system for Suinetto da latte di Sardegna traceability:



Pinna et al. *2007*, modified

	Investigated criterions			Averaged score
	Reliability	Accuracy	Compatibility	
Reliability	0,546	0,571	0,50	0,539
Accuracy	0,273	0,286	0,33	0,297
Compatibility	0,182	0,143	0,167	0,167

Score:
1 to **10** according to results from EID+DNA at indicators test

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Parameters evaluated to establish readability, repeatability, univocability of EIC and DNA profile

Product value chain

In vivo **traceability**

In farm controls
Transportation
At abattoir

At slaughterhouse

Electric stu
J
Scorching
Washing
Evisceration
Recovery

Carcass traceability

DNA matchi
(and
muscular tissue)

SW122
IGF1
SW240
S0068
SW72
S0225

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Costs quantification

The husbandry costs were calculated according to costs of the "Suino Tipico Sardo" in agreement with the Disciplinary of production.

The integrated system EID+DNA costs were evaluated according to costs of electronic devices and tools for 355 EID piglets and DNA analysis on 42 piglets (11.8%).

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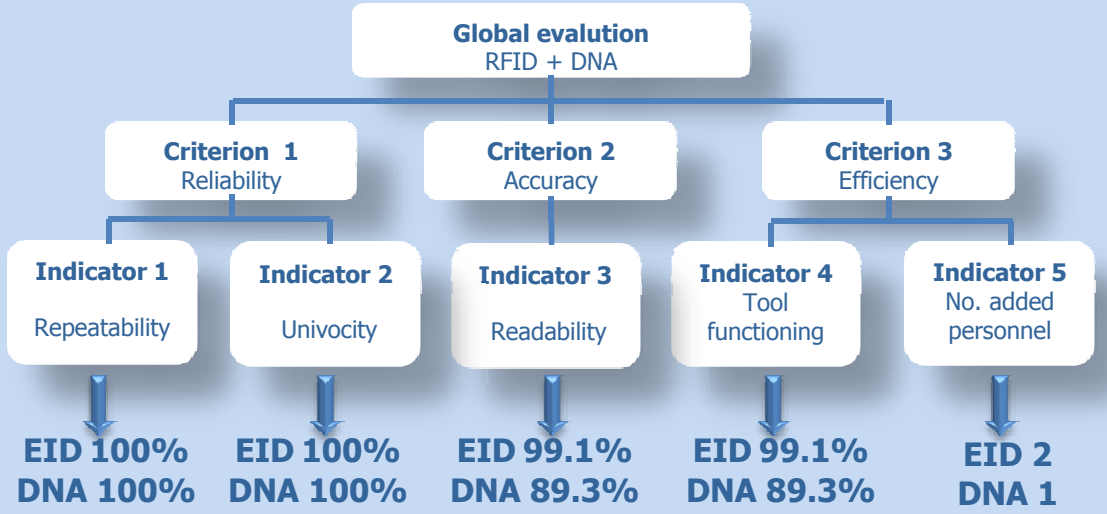
Technical performance of the integrated system EID + DNA



Deaths 0.56%
Accidents 2.54%
Recovery of transponders at abattoir 100%
No cases of DNA matching between 2 different piglets
No cases of non – identity (cross control)

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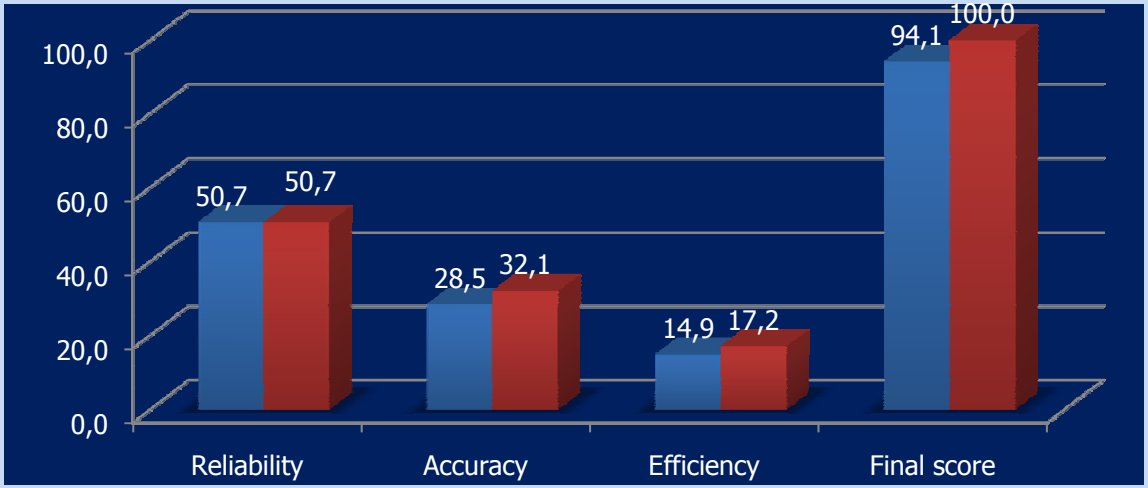
Global score (%) of the integrated system EID + DNA



Costs/piglet with the integrated system EID + DNA and impact on total costs

Costs	€.	€/kg	%
Sow feeding	21.3	3.25	55.3
Farm/abattoir work	4.4	0,67	11.4
Various costs	2.3	0.35	5.91
EID+sample+DNA analysis (6 microsatellites)	10.5	1.67	27.2
Total costs	38.5	5.88	100

Productive information:
Parturition sow/2 years: 5
Piglets at abattoir/parturition: 7-8
Piglet life span: 3-5 weeks
Averaged carcass weight: 6550 g

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Summary

The integrated system RFID+DNA tested in the limited production of the suckling piglets "Suinetto di Sardegna" for origin protection and brand reinforcement showed to be:

1. **Reliabile, accurate and efficient at 94.1%**

2. **Nearly one third of total costs of production per traced carcass produced according to the Disciplinary of production requirements**

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- **At present,** ***costs to face appear higher than direct benefits***

- **Decreasing trend of costs due to massive deployment of RFID, minimum acceptable levels of economic** ***break-even point can be achieved in a short period***

- **If the new technology becomes a standard for the traceability of the suckling piglet,** ***incremental benefits can arise from the reinforcement of the "brand"*** **of the Suinetto da latte di Sardegna**