






Univerza v Ljubljani
 Biotehniška fakulteta
 Oddelek za zootehniko



Ensuring Breed Traceability in Meat Products Based on Genomic Information

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PROGRAM RAZVOJA PODEZELJA
 Evropski kmetijski sklad za razvoj podeželja Evropska unija investira v vaša območja

Traceability regulations for pigs

LEFT EAR

- Identification number
- Breeding programme for local Krškopolje pig




RIGHT EAR

- Identifying the group of pigs to determine the farm of birth
- Rules on the identification and registration of pigs (EU Directive)


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Aim of the research



Loss of information





Implement methods for traceability and verification of pigs and meat with help of genomic information

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Materials

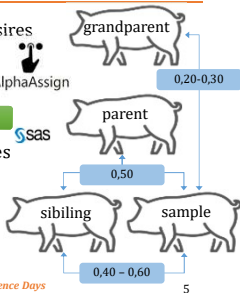
Samples	Krškopolje pig	Modern genotypes
illumina SNPchip	80k & 50k	50k
Ear tissue samples	1616 / 1524	580 / 547
Meat and meat products samples	32 / 27	6 / 6 Selective samples
Mixed meat test	6 / 1	5 / 2
	40.002 SNP	40.669 SNP
	total 34.396 SNPs	

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Methods

- A** Parentage assignment out of potential sires and dams with known litter
 - Each mating of sire and dam must be recorded in the database
- B** Closest relatives with KP pigs
- C** Closest relatives with modern genotypes
- D** Breed assesment (**A** & **B** & **C**)

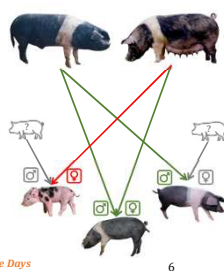


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RESULTS Parentage assignment

Genomic information of both parents				
♂	♀	♂	♀	Σ
501	35	49	40	625
Genomic information of only one parent				
♂	♀	♂	♀	Σ
188	17	194	30	429



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Breed assignment of meat and meat products

Samples of products	N	Breed assignment		
		Confirmed	Uncertain	Rejected
Meat	10	2	2	6
Meat products from one carcass (dry meat)	13	10	1	2
Meat products from more than one carcass	6	0	3	3

Parents were not assigned, samples are related to KP pigs

Suspected forgery of origin related with modern genotypes

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Breed assessment of meat

Type of meat	Sire	Dam	Max. gR		Breed assessment
			KP	MG	
Shoulder	✓	✓	0,6780	0,0746	✓

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Breed assessment of meat

Type of meat	Sire	Dam	Max. gR		Breed assessment
			KP	MG	
Neck	-	-	0,4624	0,0153	*

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Breed assessment of meat

Type of meat	Sire	Dam	Max. gR		Breed assessment
			KP	MG	
Ham	-	-	0,0954	0,1891	! 11

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What could have happen in pig supply chain?

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1 Critical point – Mating

- Identification of boar
- Possible mistakes
 - Delayed record
 - Misidentification of boar
 - Harem breeding

Zootechnical documentation
DNEVNIK PRIPUSTOV IN OSEMENITEV / HAREMSKI P.

Datum prijata / uvoznice / iz države	Datum vključitve vlinije / haremski pripravek	Ušesna številka / oznaka	Ušesna št. / oznaka	Lasnik / merjas. / izvajalec	Opombe


* Če je svinja v haremskem pripravišču le nekaj dni, se zapíše datum od ___ do ___
Obrazec poslati na: KGZS-Zavod NM, Štefka Vodič, Smilniška 14, 8000 Novo mesto

Genomic information of both parents				
501	35	49	40	625
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2 Critical point – Marking

- Ear tagging of each live piglet
- Possible mistakes:
 - Piglets are mixed
 - Late marking
 - Lost records
 - False marking



Številka	Ime	Starost	Spol	Barva	Opombe
188	188	188	188	188	188
189	189	189	189	189	189
190	190	190	190	190	190
191	191	191	191	191	191
192	192	192	192	192	192
193	193	193	193	193	193
194	194	194	194	194	194
195	195	195	195	195	195
196	196	196	196	196	196
197	197	197	197	197	197
198	198	198	198	198	198
199	199	199	199	199	199
200	200	200	200	200	200

Genomic information of both parents				
501	35	49	40	625

Genomic information of only one parent				
188	17	194	30	429

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Critical points

3 Loss of ID ear tag



4 Transport and trade



Zahrevak za poročilo povzeto iz knjige kontrolne dokumentacije

Številka	Ime	Starost	Spol	Barva	Opombe
11101	11101	11101	11101	11101	11101
11102	11102	11102	11102	11102	11102
11103	11103	11103	11103	11103	11103
11104	11104	11104	11104	11104	11104
11105	11105	11105	11105	11105	11105
11106	11106	11106	11106	11106	11106
11107	11107	11107	11107	11107	11107
11108	11108	11108	11108	11108	11108
11109	11109	11109	11109	11109	11109
11110	11110	11110	11110	11110	11110

Missing records

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5 Critical point – Slaughter



6 Critical point – Processing meat



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Conclusions

- With parentage assignment and then breed assessment the origin of meat can be confirmed
- The origin (especially fresh meat) was falsified by breeder or producers
- Identified 6 critical points in supply chain of Krškopolje pig meat
- Further research in Krškopolje pig genome



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