Local pig breeds: nutritional requirements, innovative practices and local feeding resources as challenges in project TREASURE

Rosa Nieto, C. Pugliese, José Pedro Araujo, Rui Charneca, Juan Maria Garcia Casco, Elena Gonzalez Sanchez, Francisco I. Hernandez Garcia, Mercedes Izquierdo, Danijel Karolyi, Goran Kušec, et al.

Local pig breeds: nutritional requirements, innovative practices and local feeding resources as challenges in project TREASURE

Marjeta ČANDEK-POTOKAR, Rosa NIETO, Carolina PUGLIESE, Jose P. ARAUJO, Rui CHARNECA, Juan M. GARCIA CASCO, Elena GONZÁLEZ SÁNCHEZ, Francisco I. HERNANDEZ-GARCIA, Mercedes IZQUIERDO, Danijel KAROLYI, Goran KUŠEC, Benedicte LEBRET, Marie-José MERCAT, Matthias PETIG, Čedomir RADOVIĆ, Radomir SAVIĆ

Kmetijski inštitut Slovenije
Agricultural Institute of Slovenia

Animal Science Days,
September 20-22, 2017,
Brandlucken, Austria

Funded by European Union
Horizon 2020
Grant agreement No 634476

Local (autochthonous) pig breeds

- a heritage of agricultural biodiversity
- not competitive (low productivity)
- variety of rearing systems adapted to local agro-geo-climatic conditions
- preservation often assured via subsidies (public money)
- self-sustainability with agricultural use







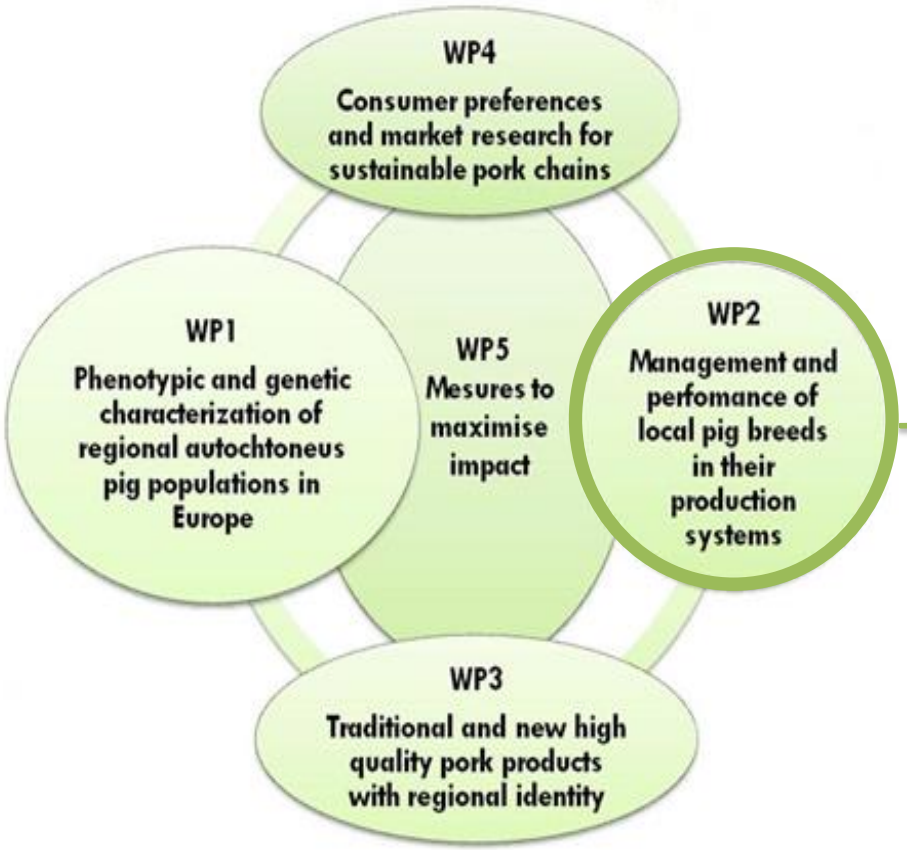
Idea & challenge
for project TREASURE

Animal Science Days, September
20-22, 2017, Brandlucken, Austria

Funded by European Union
Horizon 2020
Grant agreement No 634476

TREASURE is a RIA project of H2020 devoted to traditional genetic resources in pig production.

improve the potentials of local pig breeds (esp. untapped) for their enhanced use



- *performances*
- *nutrition (requirements)*
- *use of locally available feeding resources => product quality*
- *innovative management practices => welfare*

Funded by European Union Horizon 2020
Grant agreement No 634476

Management and performances of local pig breeds in their production systems

TREASURE

- **15 experiments on 12 breeds**

a) *Nutritional requirements of growing pigs and reproductive sows*

b) *Innovative practices*

c) *Housing/rearing conditions*

d) *Locally available feeding resources*

Highlights of first results

Funded by European Union
Horizon 2020
Grant agreement No 634476

a) Nutritional requirements of growing pigs and reproductive sows

- little is known about the nutritional requirements of local pig breeds
- metabolic trials conducted on two model breeds – *Iberíco* and *Cinta Senese*

I. Protein requirements of Cinta Senese **growing pigs**

II. Protein requirements of Iberico **growing pigs** (immunicastrated male and female)

III. Protein requirements in **lactating** Iberico **sows**

IV. Modelling studies with InraPorc®

Animal Science Days, September 20-22, 2017, Brandlucken, Austria

Funded by European Union Horizon 2020 Grant agreement No 634476

a) Nutritional requirements of growing pigs and reproductive sows

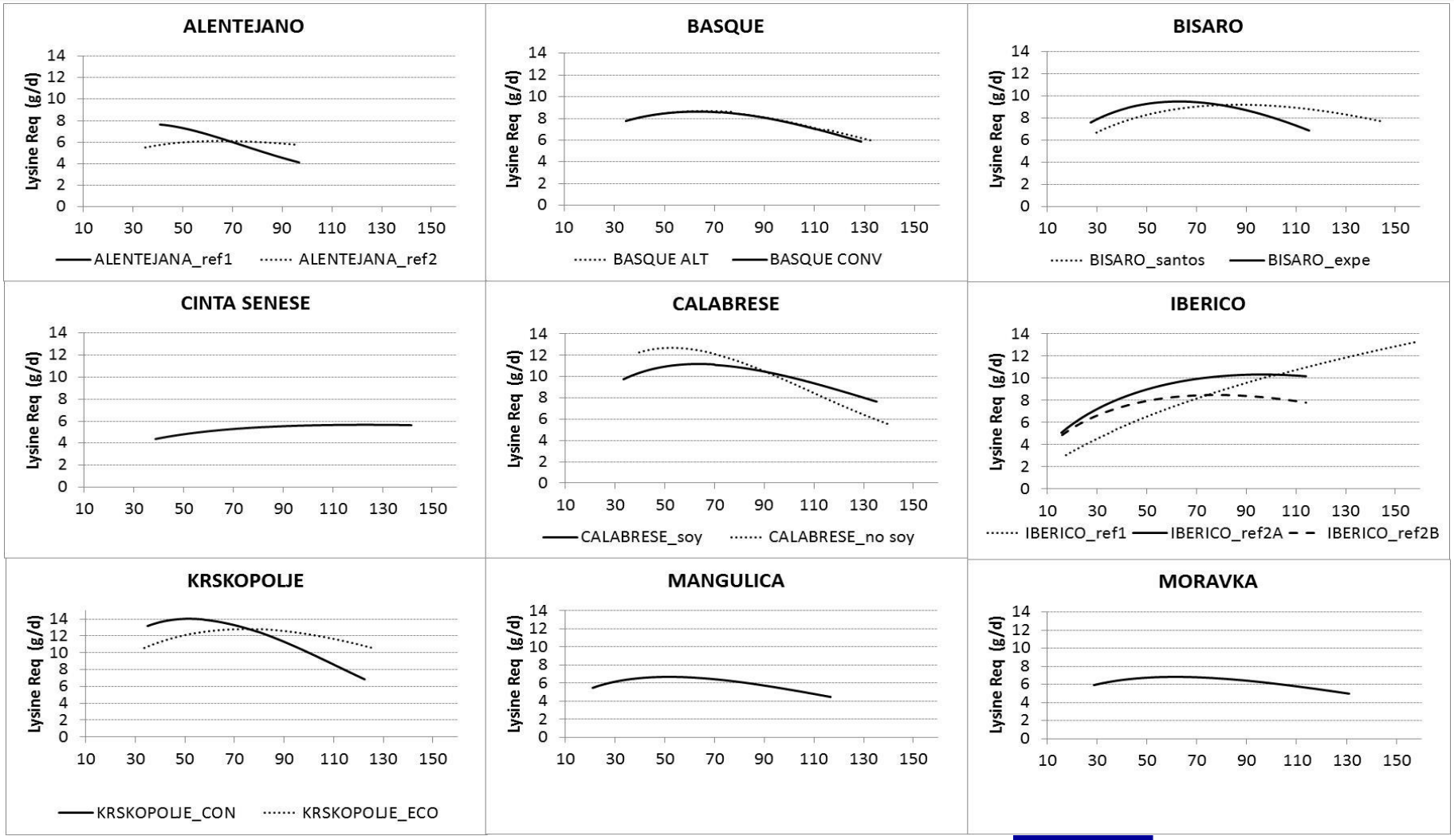
Objective	Breed	Highlights on first available results
1. Protein requirements in immunocastrated males and females	Iberian	• No differences in ADG and FE between protein treatments (12-16%). • Higher ADG and FE of IC_males than SC and IC_females. • Plasma urea decreased in pigs of three sexes fed on lower protein diets • N balance results will elucidate if protein requirements differ among immunocastrated and surgically castrated male pigs.
2. Protein requirements in lactating sows	Iberian	• No results available yet
3. Protein requirements in growing pigs	Cinta Senese	• Growth rate (30-60 kg) higher in pigs fed iso-energetic diet with less proteins (12 vs. 18% proteins) • Cuts weights and the percentage of the main tissues were similar between diets.
4. Modelling studies Breeds: Alentejano, Bisaro, Iberico, Krškopolje, Mangulica, Moravka, Cinta Senese, Apulo Calabrese		• mean protein deposition (PD) lower than in modern breeds. The values spanned from 40–110 g PD/day with the lowest values observed for Mangulica, Moravka, Cinta Senese and Alentejano (<50g PD/day), and highest for Krškopolje and Apulo Calabrese (>80 g PD/day) • precocity indicator lower (than in modern breeds)

Presentation later

Funded by European Union Horizon 2020
Grant agreement No 634476

Growth modelling studies with InraPorc®

Example: LYS requirements from 40-100 kg LW



Animal Science Days, September 20-22, 2017, Brandlucken, Austria

Funded by European Union Horizon 2020
Grant agreement No 634476

b) Innovative practices

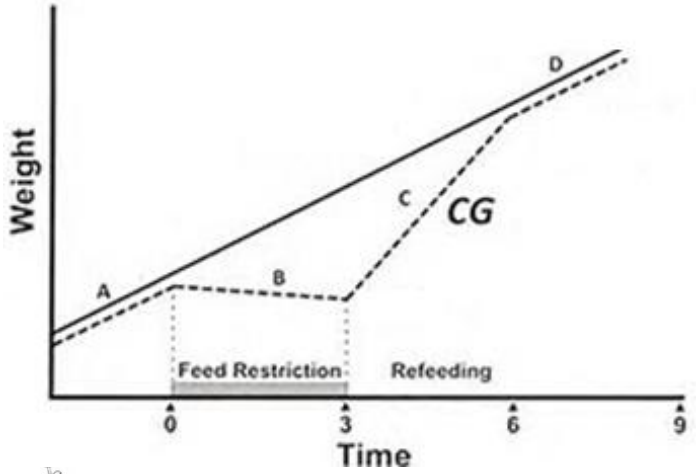
- Effects on productive traits, product quality and animal welfare

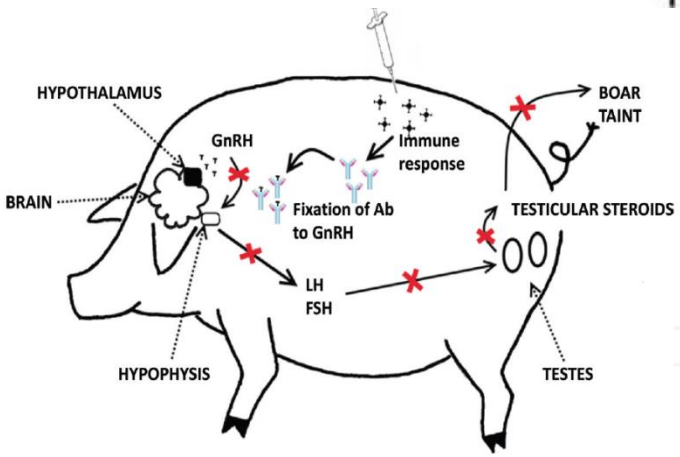
I. Compensatory growth in Cinta Senese

II. Zootechnical evaluation of Ribatejano (Alentejano × Bísaro)

III. Immunocastration (IC)

- ✓ in Iberíco (protocol adapted to *montanera* system)
- ✓ Performances - Iberíco
- ✓ Performances - Mangulica





Funded by European Union Horizon 2020
Grant agreement No 634476

b) Innovative practices

I. Compensatory growth in Cinta Senese

II. Zootechnical evaluation of Ribatejano (Alentejano × Bísaro)

Objective	Breed	Highlights on first available results
1. Compensatory growth	Cinta Senese	• protein-restricted-pigs showed higher slaughter weight & greater lipid deposition & higher proportion of subcutaneous (inner layer) backfat.
2. Zootechnical performance of Ribatejano crossing Alentejano×Bísaro (AL×BI) Bísaro×Alentejano (BI×AL)	Crossing Ribatejano	• Birth weight - AL×BI > BI×AL. • Colostrum intake, mortality rate during lactation and weight at 28 days were similar in both crosses • in the first growth period (30-65 kg) - AL pigs had a lower ADG than BI pigs and both crosses (which were similar) • in the second growing and fattening period (65-150 kg) ADG was similar in all genotypes

Funded by European Union Horizon 2020
Grant agreement No 634476

b) Innovative practices - immunocastration

Objective	Breed	Highlights on first available results
3. Immunocastration – efficacy of adapted vaccination protocol to "montanera"	Iberico	• short-time (15 days) ad libitum feeding before "montanera" increased the efficacy of IC to 100% as shown by deeper and more uniform testicular atrophy, and no androstenone • testicular parenchyme colour (CIE a) was highly correlated (r=0.87) with testicular weight
4. Immunocastration – effect on performance	Iberico	• 12 % higher daily gain (40-100 kg) and feed efficiency (10%) in IC than SC males • IC males showed higher proportion of lean cuts (loin, sirloin, butt lean) and carcass length than SC males
5. Immunocastration – effect on performance	Mangulica	• no differences in overall growth rate between IC and SC, nevertheless growth rate was higher in IC than SC after V2

Presentation later

Funded by European Union Horizon 2020
Grant agreement No 634476

c) Housing – rearing system

- Effects on productive traits, product quality and animal welfare

I. Ecological and conventional system - Krškopolje

II. Indoor vs. outdoor – Schwäbish-Hälisches

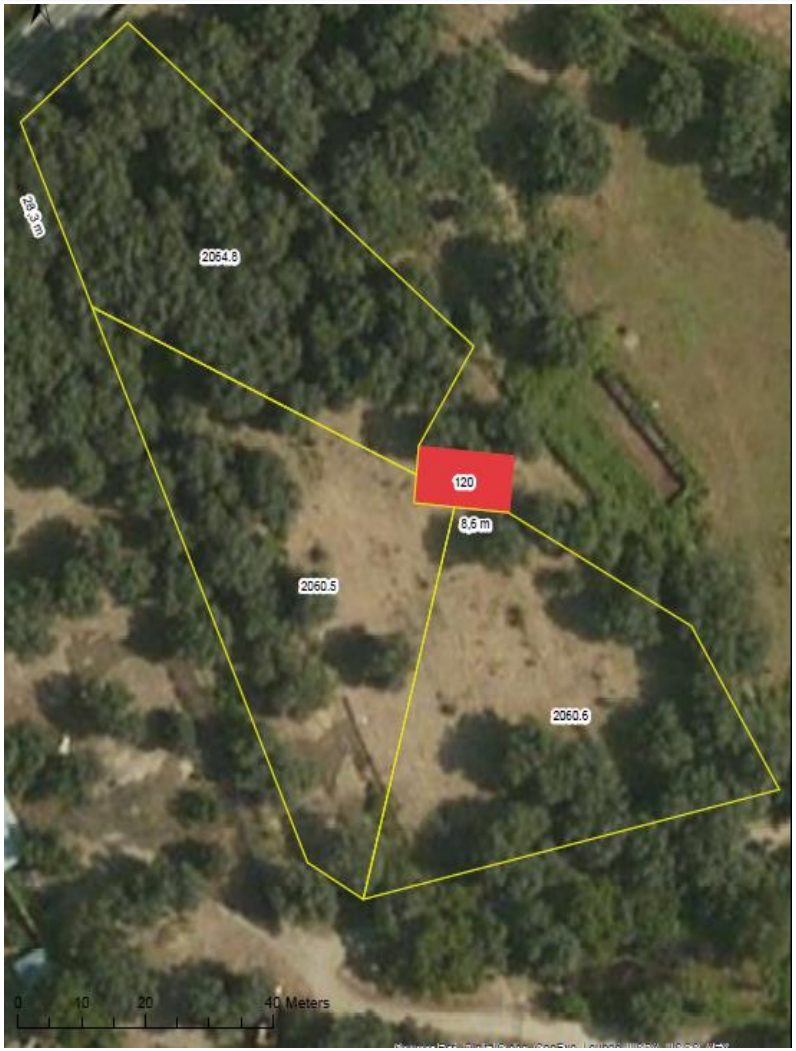
III. Indoor vs. outdoor – Crna slavonska

IV. Development of body composition in indoor system – Crna slavonska

V. Alternative housing system – development of hoop barn - Bísara

Funded by European Union
Horizon 2020
Grant agreement No 634476

Hoopbarn development – PT trial



Animal Science Days, September 20-22, 2017, Brandlucken, Austria

Funded by European Union Horizon 2020 Grant agreement No 634476

c) Housing – rearing system

- Effects on productive traits, product quality and animal welfare

Objective	Breed	Highlights on first available results
1. Comparison of performances in ecological and conventional system (from 70 kg onwards)	Krškopolje	• in equivalent dietary conditions, pigs reared according to ecological standards exhibited 10% higher daily gain; • fat tissue deposition intensifies in Krškopolje pigs at 70-80 kg live weight; • ultimate pH lower (muscle energy reserves higher) in pigs reared according to organic production rules; • pigs in ecological rearing system showed different myosine heavy chain expression.
2. Performances in indoor and outdoor system	Schwäbisch-Hällisches	• in equivalent dietary conditions, pigs reared outdoor were slightly more uniform regarding carcass traits (eg lean meat content) than indoor reared pigs
3. Alternative housing system, performances and welfare	Bísaro	• Alternative housing with hoop barn (and outdoor access area) was developed • Similar growth performance was observed in hoop barn and standard confinement rearing system (but welfare improvement)
3.A Performances in indoor and outdoor system; 3.B Development of body composition in pigs kept in indoor system	Black Slavonian	• pigs kept indoors exhibited increased fatty tissue growth; • outdoor raised pigs had low daily gains of live weight and fat. Muscle tissue seems to persist in growth even in the late stages, although at low rate.

Funded by European Union Horizon 2020
Grant agreement No 634476

d) Feeding resources

- Effects on performances and product quality





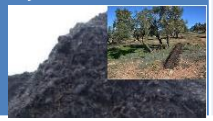



Animal Science Days, September 20-22, 2017, Brandlucken, Austria

Funded by European Union
Horizon 2020
Grant agreement No 634476

d) Feeding resources

- Effects on performances and product quality

Feeding resource	Breed	Highlight on first available results
Lucerne hay 	Krškopolje	• fat tissue of pigs supplemented with lucerne hay had more vitamin A and n-3, n-6 polyunsaturated fatty acids
Root crops 	Krškopolje	• feeding with root crops and cereals showed strongly reduced growth rate compared to pigs fed concentrates • more intense m. longissimus colour (lower CIE L, higher CIE a) Poster
Acorns 	Schwäbisch -Hällisches	• 20% replacement of standard diet with acorns had no effect on carcass characteristics; • data on meat quality and growth is in progress
Acorns	Turopolje	• 30% replacement of standard diet with acorns had no effect on fatty acids of backfat, but increased content of saturated fatty acid in intramuscular fat • strong effect was noted on gut microbiota
Tannin wood extract 	Mangalitsa	• 2% diet supplementation with tannin rich wood extract resulted in 12% decrease in growth rate • analyses of meat quality are in progress;
Olive by-product "alperujo" 	Iberian	• The use of olive by-products (in dry or wet presentation) during growing period as a substantial component of the diet did not affect the commercial slaughter weight nor carcass composition after fattening "montanera" period (acorn and grass). Results are similar to traditional restricted feeding system. Presentation later

Funded by European Union Horizon 2020
Grant agreement No 634476

Feeding resources

- Effects on performances and product quality

Feeding resource	Breed	Highlight on first available results
Rice husk 	Iberian	• three groups varying in level of fibers were tested in "premontanera" phase (10-14 months of age), without any diarrheic problems; • ADG until the end of "premontanera" was greater for High fiber group, which also exhibited steadier (in time) and more homogeneous (among animals) growth rate.
Potatoes  Germinated seeds 	Bísaro	• No results are available yet; analyses of meat quality are in progress
Season: spring/winter (availability of feedstuffs)	Gascon	• no effect of season on growth rate; • pigs slaughtered in winter had slightly fatter carcasses; • ultimate pH was lower in winter slaughtered pigs (higher muscle energy reserves); • IMF was not affected in loin but was higher in ham of pigs slaughtered in spring; • ratio of n-6/n-3 fatty acids was reduced in both subcutaneous and im fat of spring slaughtered pigs • analysis of pigs slaughtered in autumn is in progress

Funded by European Union Horizon 2020
Grant agreement No 634476

Conclusions

- for many untapped local breeds these are the first results on their performances in a controlled experimental environment,
- growth potential of local breeds is often underestimated,
- protein deposition (their precocity index) is substantially lower than in modern breeds,
- for better understanding of nutritional (protein) requirements of local pig breeds
  a) studies on Iberico and Cinta Senese,

  b) modelling studies,
- innovative practices => to improve knowledge about the alternative solutions in production systems with local pig breeds,
- Investigations with locally available resources => exploitability and benefits for production systems with local pig breeds & impact on product quality.

Funded by European Union
Horizon 2020
Grant agreement No 634476

THANK YOU FOR YOUR ATTENTION

Follow us: https://treasure.kis.si/

https://www.facebook.com/treasureH2020/

https://twitter.com/Treasure_H2020

ACKNOWLEDGEMENT

The experiments were performed with the help of the farmers and many colleagues involved in the project and their contribution is greatly appreciated.

Presented work has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634476 (project acronym TREASURE). The content reflects only the author's view and the European Union Agency is not responsible for any use that may be made of the information it contains.

Funded by European Union Horizon 2020 Grant agreement No 634476