

Program

Thursday, November 17

- 08.30 Registration
- 09.30 Opening remarks
József Rátky, director general, Institute for Animal Breeding and Nutrition, Herceghalom, Hungary
- Welcome speech
Endre Kardeván, State Secretary, Ministry of Rural Development
- 09.50 **Session 1 – Animal Reproduction**
Chairman: Noboru Manabe
- 09.50 RESULTS OF REPRODUCTIVE RESEARCH IN FEMALE MANGALICA PIGS
Klaus-Peter Brüssow¹, Istvan Egerszegi², Helmut Torner¹, Jozsef Rátky²
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- 10.10 EFFECT OF EXTENDER AND STORAGE PERIOD ON LARGE WHITE AND INDIGENOUS KOLBROEK SEMEN FOLLOWING ANALYSIS BY COMPUTER ASSISTED SPERM ANALYSIS
T.L. Nedambale^{1,3,4}, M.B. Masenya^{1,2}, M.L. Mphaphathi³, M.H. Mapeka^{1,3}, M.B. Makhafola^{1,2}, P.H. Munyai^{1,4}, P.P. Malusi¹, F.V. Ramukhithi^{1,3}
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- 10.30 DIFFERENTIAL EXPRESSION OF GDF9, TGFB1, TGFB2 AND TGFB3 IN PORCINE OOCYTES ISOLATED FROM DIFFERENT FOLLICLE SIZE BEFORE AND AFTER IN VITRO CULTIVATION
Jędrzej M. Jaśkowski¹, Marta Jackowska¹, Bartosz Kempisty², Magdalena Woźna¹, Paweł Antosik¹, Dorota Bukowska¹, Hanna Piotrowska³, Piotr Zawierucha², Maciej Budny⁴, Klaus-Peter Brüssow⁵
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- 10.50 LITHUANIAN INDIGENOUS WATTLE PIGS AND THEIR ADAPTATION TO DIFFERENT PRODUCTION NICHES
Violeta Razmaitė
Institute of Animal Science of Lithuanian University of Health Sciences, R. Žebenkos 12, LT-82317 Baisogala, Lithuania, E-mail: razmusv@one.lt
- 11.10 Coffee break

- 11.30 **Session 2 – Animal Reproduction**
Chairman: Klaus-Peter Brüssow
- 11.30 ORGANOMETRIC DATA OF THE REPRODUCTIVE TRACT IN MOO LAT PIG
Soukanh Keonouchanh¹, István Egerszegi², T Dengkhounxay¹, Klaus-Peter Brüssow³, Péter Sarlós², József Rátky²
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- 11.50 HIGH EXPRESSION OF BID, WHICH IS A KEY MOLECULE CONTROLLING THE SELECTION OF OOCYTE AND FOLLICLE AND IS INVOLVED IN GRANULOSA CELL APOPTOSIS, IS CHARACTERISTICS IN MANGALICA OVARIES
Noboru Manabe¹, József Rátky², Keiichi Sezaki¹, Takafumi Sai¹, Yasufumi Goto¹, Ichiro Onoyama¹, Jun-You Li¹
¹Animal Resource Science Center, The University of Tokyo, Kasama, Japan
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- 12.10 IMPROVEMENT OF AN ALPINE PASTURE USING MANGALICA PIGS
Beate Berger¹, Franz Fischerleitner¹, Thomas Strubreiter²
¹Institute of Organic Farming and Biodiversity of Farm Animals, Austrasse 10, 4606 Thalheim, Austria
²Arche Hof Auerbauer, Scheffau 25a, 5440 Golling, Austria
- 12.30 EFFECT OF PERIPARTUM AND LACTATIONAL SUPPLEMENTATION OF IBERIAN SOWS WITH FERMENTED POTATO PEPTIDES (LIANOL®) ON LATE GESTATION AND PIGLET SURVIVAL AND DEVELOPMENT
Hernández-García, F.I.¹, Izquierdo, M., Raboso, C., Rosario, A., Pérez, M.A.
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- 12.50 Lunch
- 14.00 **Session 3 – Meat quality & production**
Chairman: Tamás Éder
- 14.00 COMPARISON OF FATTY ACID PROFILE OF DIFFERENT TYPE OF PIGS (MEAT AND FAT-TYPE) FED SAME COMPOSITION OF DIET
Hedvig Fébel¹, Júlia Seenger², Mária Horvai Szabó², Csaba Ábrahám³, Mária Weber², Krisztián Balogh² and Miklós Mézes²
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- 14.20 COMPARING GENETIC EVALUATIONS FOR CARCASS AND MEAT QUALITY TRAIT OF HEAVY IBERIAN PIGS FATTENED IN TWO DIFFERENT FREE-RANGE SYSTEMS
Juan M. García Casco¹, M. Carmen Rodríguez², Luis Silió² and Almudena Fernandez²
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- 14.40 PREDICTION OF MEAT CUT WEIGHTS AND YIELDS FROM IBERIAN PIGS BY ULTRASONOGRAPHIC IN VIVO DETERMINATIONS
Izquierdo, M., Ayuso, D., Hernández-García, F. I., Corral, J. M., Pérez, M. A.
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- 15.00 LIPID PEROXIDE AND GLUTATHION REDOX STATUS OF LIVER, SPLEEN AND KIDNEY IN DIFFERENT GENOTYPES OF PIGS
Krisztián Balogh^{1,2}, Mária Weber³, Mónika Heincinger², Julianna Seenger², Miklós Mézes²
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- 15.20 Coffee break
- 15.50 PERFORMANCE TEST RESULTS OF SWALLOW BELLED MANGALITZA COMPARED TO MODERN GENOTYPES
Julianna Seenger¹, Hedvig Fébel², Csaba Ábrahám¹, Mária Weber¹, Krisztián Balogh³, Mária Horvainé Szabó¹, Mónika Heincinger³, Miklós Mézes³
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- 16.10 MANGALICA IS A UNIQUE MARKET NICHE – FOCUSING ON CONSUMER HABITS
Popovics A.¹, Polreczki Zs.², Szakály Z.², Szente V.², Micsinai A.¹, Tóth P.³
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²Kaposvár University
³Olmos és Tóth Ltd.
- 16.30 **Session 4 – Embriology**
Chairman: Beate Berger
- 16.30 CRYOPRESERVATION AND GENE BANKING OF PORCINE OOCYTES; LIMITATIONS AND CHALLENGES
Tamás Somfai¹, Kazuhiro Kikuchi², Hiroyuki Kaneko³, Junko Noguchi⁴, Naomi Kashiwazaki⁵, Takashi Nagai⁶
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- 16.50 GENETIC, METABOLIC AND NUTRITIONAL FACTORS AFFECTING REPRODUCTIVE PHYSIOLOGY OF FATTY PIG BREEDS. STUDIES ON THE IBERIAN PIG
Antonio Gonzalez-Bulnes¹, Cristina Ovilo², Pilar Pallares¹, Raul Sánchez-Sánchez¹, Laura Torres-Rovira³
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- 18.30 Conference Dinner

Friday, November 18

- 08.30 Registration
- 09.00 **Session 5 – Molecular Biology & Mangfood project**
Chairman: József Burgyán
- 09.00 DEVELOPMENT OF A MANGALICA BREED-SPECIFIC PCR-BASED DIAGNOSTIC SYSTEM
Adrienn Micsinai¹, Viktor Stéger², Gábor Tóth², Ferenc Marincs², Klára Dallmann¹, Anita Mohr¹, János Molnár¹, Réka Szántó-Egész¹, Anna Jánosi³, Gabriella Ujhelyi³, Erika Koppányné Szabó³, Attila Zsolnai⁴, István Anton⁴, István Egerszegi⁴, József Rátky⁴, Péter Tóth⁵
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- 09.20 IDENTIFICATION OF SNPS ASSOCIATED TO THE MANGALICA BREED BY WHOLE GENOME SCAN
Attila Zsolnai¹, Ferenc Marincs², Viktor Stéger², János Molnár³, Gábor Tóth², Anna Jánosi⁴, Gabriella Ujhelyi⁴, Erika Koppányné Szabó⁴, Anita Mohr³, István Anton¹, Réka Szántó-Egész³, István Egerszegi¹, Klára Dallmann³, Péter Tóth⁵, Adrienn Micsinai³, József Rátky¹
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- 09.40 A QUEST FOR GENOMIC MOLECULAR MARKERS IN MANGALICA USING SECOND-GENERATION SEQUENCING AND BIONFORMATIC STRATEGIES
Gábor Tóth¹, János Molnár², Viktor Stéger¹, Attila Zsolnai³, Ferenc Marincs¹, Anita Mohr², Réka Szántó-Egész², Gabriella Ujhelyi⁴, Anna Jánosi⁴, Péter Tóth⁵, József Rátky³, Adrienn Micsinai²
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- 10.00 EFFECTS OF PROLACTIN RECEPTOR GENOTYPE ON THE LITTER SIZE OF MANGALICA
Tempfli K., Bali Papp Á.
University of West Hungary, Faculty of Agricultural and Food Sciences
- 10.20 Coffee break
- 10.50 **Round table discussion – Industry**
Moderator: József Rátky
- Contributors:
- | | |
|--|--|
| Kenichi Ra, 551 Horai, Japan | Péter Tóth, Olmos and Tóth Ltd., Hungary |
| Juan-Vicente Olmos, Jamones Segovia, Spain | László Zanathy, Wessling Hungary Ltd., Hungary |
| Tamás Éder, Bonafarm Ltd., Hungary | György Slezák, Hungapig Ltd., Hungary |
- 12.30 Closing remarks
József Rátky, director general, Institute for Animal Breeding and Nutrition, Herceghalom, Hungary
Noboru Manabe, chief of the Research Unit for Animal Life Sciences Animal Resource Science Center, The University of Tokyo, president of the Society for Reproduction and Development, Japan
- 13.00 Visit at the Research Institute for Animal Breeding and Nutrition, including lunch
- 16.00 End of the program

Abstracts

RESULTS OF REPRODUCTIVE RESEARCH IN FEMALE MANGALICA PIGS

Klaus-Peter Brüssow¹, Istvan Egerszegi², Helmut Torner¹, Jozsef Rátky²

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Since in 1996 the Hungarian Mangalica was endangered and the number of breeding sows was on a low point, a Hungarian-German research project was activated to propagate Mangalica by biotechnical methods and to highlight the physiological background of low fecundity. By means of adapted estrus synchronization systems and embryo transfer (ET) the institute's breeding herd in Herceghalom was increased. Altogether 202 Mangalica piglets were born after ET. Further research was focused on follicle and oocyte qualities and on uterine development during early pregnancy. Though no differences in morphometric data of the reproductive organs, we found, compared to Landrace, that altered intrafollicular oocyte maturation and restriction of uterine growth during the initial process of early pregnancy could be reasons of lower fecundity in Mangalica. No differences were obtained in the general release profiles of reproductive hormones FSH, LH, progesterone (P4) and estradiol during the estrus cycle and early pregnancy. However, the intrafollicular P4 concentrations were 10-times higher in Mangalica which could have an influence on oocyte development, too. Considerable differences were found in the secretion ratio of P4 calculated per corpus luteum and in the concentration of leptin compared to Landrace sows. The concentrations of both hormones were 3- to 4-times higher in Mangalica. The higher level and the up to one day later decrease of progesterone, which prolongs the negative feedback of P4 on gonadotropin secretion from the pituitary, and the increased leptin concentrations substantially down-regulated the pulsatile release of LH at the beginning of the follicular phase of the estrus cycle. Thus the secretion of gonadotropins was impaired, and as a consequence growth and maturation of follicles was diminished in Mangalica. Our research provided evidence on differences in the reproductive processes in Mangalica sows which could be estimably for the preservation and propagation of this valuable native pig breed.

EFFECT OF EXTENDER AND STORAGE PERIOD ON LARGE WHITE AND INDIGENOUS KOLBROEK SEMEN FOLLOWING ANALYSIS BY COMPUTER ASSISTED SPERM ANALYSIS

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The choice of the short-term semen extender is important to preserve the diluted boar sperm cells before artificial insemination. The aim of this study was to identify suitable extender for short-term semen storage at 17°C of Kolbroek and Large White boars. Eight ejaculates were collected separately from four Kolbroek and Large White boars using the gloved-hand technique in a 300 mL glass beaker. The filtered sperm fraction were sealed with a gauze filter inside a pre-warmed (39°C) insulated thermos flask. Following semen collection, the semen was evaluated for macroscopic and microscopic characteristics. The semen was pooled and diluted with four different short term extenders, namely: Beltsville Thawing Solution (BTS), Kobidil, Citrate and Tris-based extenders. Sperm cells motility parameters were evaluated using Sperm Class Analyzer[®] (SCA) at 0 h (control), 3 h, 24 h and 48 h interval. The highest total sperm motility rates were observed in semen diluted with Tris-based extender (74.1%) for Kolbroek boar at 48 hours of storage. However, the lowest total sperm motility rates were recorded on BTS (28.6%), Kobidil (15.6%) and Citrate (10.1%) in Kolbroek group at 48 hours of storage. Large White boar semen diluted with BTS, Kobidil and Tris showed significantly higher sperm motility rate (62.9%, 69.3% and 65.1%, respectively) than Citrate extender (27.6%) at 48 hours of storage. In conclusion, Kolbroek sperm cells can be transported within 24 to 48 h in South African regions without adversely affecting the motility rate when diluted with Tris-based extender and stored at 17°C without cryopreserving them. However, Large White semen may be transported within 24 h to 48 h in South African regions when diluted with BTS, Kobidil and Tris-based extenders.

Keywords: Semen, Kolbroek, period, extenders, indigenous

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DIFFERENTIAL EXPRESSION OF GDF9, TGFB1, TGFB2 AND TGFB3 IN PORCINE OOCYTES ISOLATED FROM DIFFERENT FOLLICLE SIZE BEFORE AND AFTER *IN VITRO* CULTIVATION

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The TGFB superfamily genes are involved in several important cell functions, including proliferation and differentiation. Moreover, the role of these genes expression in growth and development of theca and granulosa cells is well recognized. However, the dependence between the stage of maturity or follicular size and the expression of these genes in pigs is still not entirely known. This study was aimed to investigate the expression pattern of GDF9, TGFB1, TGFB2 and TGFB3 in porcine oocytes before and after IVM as well as in oocytes collected from follicles of different sizes.

The RQ-PCR was performed to analyze the expression of GDF9, TGFB1, TGFB2 and TGFB3 in oocytes before and after IVM (oocytes cultured for 44 h in TCM-199) isolated from large (>5 mm), medium (3-5 mm) and small (<3 mm) follicles collected from slaughterhouse ovaries of 28 puberal crossbred Landrace gilts.

We found an increased expression of both TGFB1 and TGFB2 in oocytes before IVM collected from large follicles as compared to medium and small, ($P<0.05$, $P<0.001$, $P<0.01$, $P<0.05$, respectively). In this group of oocytes we did not observe differences in GDF9 and TGFB3 mRNA levels. However, GDF9 expression in oocytes after IVM was significantly higher in large follicles and medium as compared to small ($P<0.01$, $P<0.001$, respectively). Moreover, an increased expression pattern of TGFB1, TGFB2 and TGFB3 in oocytes collected from large follicles as compared to small was also observed. The highest GDF9 and TGFB1 mRNA levels in oocytes after IVM as compared to oocytes before IVM were also noted.

In conclusion, the follicular size may determine the expression pattern of TGFB superfamily genes and it is in a stage of maturity dependent manner. Both GDF9 and TGFB1 may be useful markers involved in porcine oocytes maturation potential.

LITHUANIAN INDIGENOUS WATTLE PIGS AND THEIR ADAPTATION TO DIFFERENT PRODUCTION NICHES

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The most appropriate expression of the Lithuanian industry's objective for market pigs is their leanness, and pig production made great strides to reduce the fat content and improve the leanness of pork. However, it is expedient to raise not a scanty breed for fat production, because it could satisfy the demand of some consumers. Fatty Lithuanian indigenous wattle pigs, unique due to their morphological feature – a pair of wattle under the neck, at the end of 20th century had only single specimens remaining. The collection of these pigs and formation their herd at the Institute of Animal Science prevented total disappearing of this old breed. The status of Lithuanian indigenous wattle pigs can be considered as critical-maintained. For such a small and closed population of Lithuanian indigenous pigs, the negative effects on prolificacy may be increased due to inbreeding, therefore, it is vital to increase the population and number of holders. Although variation of their characteristics is high, there is a specific care for no selection objective to be pursued and this should be aimed at maintaining the breed's hardiness, strong constitution, high reproductive performance and various phenotypic traits without excessive lowering of back fat thickness. According to the sequence of conservation and the research of Lithuanian critical animal breeds, the maintenance of the breed should be followed by investigation of the biological-farming traits and search for the possibilities of their wider use and adaptation to production niches. Conserved Lithuanian indigenous wattle pigs are multi-coloured, fat, less demanding in terms of feeding and keeping conditions, and insensitive to direct sunlight, thus suitable for grazing. The current research interest in the Lithuanian indigenous wattle pigs originates largely from the search for the possibilities of adaptation of Lithuanian indigenous pigs to production niches through their use for the products of national heritage, an alternative for diversification of pork products from their crossbreeding with wild boar, organic production and also for production of leaner pork by using them as a dam breed in various combinations of commercial crosses or slaughtering at lower weight.

ORGANOMETRIC DATA OF THE REPRODUCTIVE TRACT IN MOO LAT PIG

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Pig production continues to be an important agriculture activity in the Lao People's Democratic Republic based on traditional methods however it is increasingly affected by social and market pressures. More than 80 percent of pig herds are native breeds and belong to small farmers with combined housing systems. Moo Lat pig one of the four indigenous swine breeds with average litter size of 5-6 piglets. Phenotypic and genotypic characterization of the breed has been done already however reproductive characterization is needed to describe this breed. Since the morphology of the reproductive organs could affect reproductive performance of Moo Lat pig this study was conducted to get some more information about the number of corpora lutea and the size of reproductive tract in Moo Lat pigs. Reproductive organs of 34 gilts (6-11 month of age) and 13 sows (> parity 1) were recovered immediately after slaughter to determine the number of ovarian features, the weight and diameter of the ovaries, and the weight and length of oviducts and uteri, respectively.

All gilts (n=34; 100 %) were cycling ones with mean number of ovulation of 8.76 ± 2.85 . In sows (n = 13) ovulation rate was 10.46 ± 4.5 . Differences were observed between left and right ovaries size, weight and ovulation rate in gilts and sows as well. Left ovaries were much more active. Oviduct length (left (L) 27.12 ± 1.35 ; right (R) 25.49 ± 1.14 and L 31.82 ± 3.65 ; R 34.14 ± 2.55 cm) and weight (L 4.41 ± 0.55 ; R 4.26 ± 0.54 and L 5.27 ± 0.84 ; R 5.36 ± 0.80 g) were not different in gilts and sows. Uterine weight and uterine horn length was significant higher in sows compared to cycling gilts (L 135.50 ± 15.02 ; R 126.75 ± 11.24 vs. L 222.27 ± 21.21 ; R 215.45 ± 20.92 g, and L 76.17 ± 4.98 ; R 75.56 ± 4.82 vs. L 135.45 ± 9.59 5; R 122.54 ± 7.72 cm $p < 0.05$).

Results of this study give basic data for reproductive characterization and support the concept that beside lower ovulation rate, shorter uterine could be the reason of decreased fecundity of Moo Lat pigs.

HIGH EXPRESSION OF BID, WHICH IS A KEY MOLECULE CONTROLLING THE SELECTION OF OOCYTE AND FOLLICLE AND IS INVOLVED IN GRANULOSA CELL APOPTOSIS, IS CHARACTERISTICS IN MANGALICA OVARIES

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More than 99% of follicles undergo atresia during follicular development and growth. Follicular atresia is predominantly regulated by granulosa cell apoptosis. However, the intracellular signaling pathway of apoptosis in granulosa cells has not been revealed. We examined changes in the expression of BH3-interacting domain death agonist (Bid) and Bcl-2-associated X protein (Bax), which are considered to promote the cell death ligand and receptor mediated process in mitochondrion dependent type II apoptosis, in porcine granulosa cells during follicular atresia. Bid and Bax mRNA and protein levels were determined by the reverse transcription polymerase chain reaction (RT-PCR) and Western blotting techniques, respectively. Levels of Bid and Bax mRNA and protein were markedly increase in granulosa cells of early atretic follicles compared to those of healthy follicles. *In situ* hybridization and immunohistochemical staining revealed that mRNA and protein of Bid and Bax were present in the granulosa cells though only negative or traces were found in healthy follicles, but strong staining were noted in atretic follicles.

Then, to confirm the proapoptotic activity of Bid and Bax in granulosa cells, we examined the effect of RNA interference of Bid or Bax on apoptosis using an ovarian granulosa cells. By RT-PCR and Western blotting, spontaneous expression of Bid and Bax was detected in the cells. We suppressed Bid and Bax mRNA expression in the cells using small interfering RNA (siRNA). When Bid or Bax mRNA was suppressed, a significant decrease in the apoptotic cell rate was noted. The present results indicate that Bid and Bax appear to be signal transduction factors in granulosa cells during follicular atresia and to play proapoptotic roles, and confirm that porcine granulosa cell is type II apoptotic cell.

Compared with Bid expression level in the ovaries of Mangalica/Mangalitsa, which is a Hungarian native pig and shows small litter size, in the expression levels in those of commercial breed (Japanese Landrace, Yorkshire, Berkshire and Duroc) was characterized by very high, suggesting that follicular granulosa cells are easily die in Mangalica ovaries. Moreover, because Bid has a role in enhancing the apoptosis in virus-infected cells, high expression of Bid in Mangalica pig may associated with high resistance to viral infectious diseases such as foot and mouth disease in them.

IMPROVEMENT OF AN ALPINE PASTURE USING MANGALICA PIGS

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Pigs are known to degrade pastures by rooting and excessive nitrogen output. In this empirical study Mangalica sows and piglets are used to improve a degraded Alpine pasture. The pasture lies between 1000 and 1100 m above sea level on silicate ground and the soil varies between sandy and peaty. The original pasture was degraded by undergrazing and consisted mainly of mat grass (*Nardus stricta*) and heather (*Erica spp.*). As the region is a landscape protected area and of touristic value improvement by ploughing and re-sowing is forbidden.

3 Mangalica brood sows and their litters are fenced twice for a 3 month period in summer on an area of roughly 3000 m². Only whole barley is used as additional feed and as an incentive to rooting. After that the mat grass and heather roots are destroyed and the soil is re-sown with a locally adapted heavy duty grass mixture for livestock. In the first year after the re-sowing the area is mown, then submitted to controlled grazing and finally in the third year returned to normal grazing routine.

The mat grass and heather are reduced to < 10 %. From the grass mixture red fescue (*Festuca rubra*) and white clover (*Trifolium repens*) have become firmly established. Both species are valuable fodder plants. Surprisingly the orchids *Dactylorhiza spp.* and *Orchis spp.* are still present even in the fenced areas.

Detailed investigations over a longer period are necessary to evaluate the further development of the plant society on former pig pastures in the Alpine region.

EFFECT OF PERIPARTUM AND LACTATIONAL SUPPLEMENTATION OF IBERIAN SOWS WITH FERMENTED POTATO PEPTIDES (LIANOL[®]) ON LATE GESTATION AND PIGLET SURVIVAL AND DEVELOPMENT

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The Iberian pig exhibit low prolificacy, high perinatal mortality and low piglet growth. A new product (Lianol[®]) containing active peptides from fermented potato increased IGF-1 blood levels and provided encouraging results about piglet survival. This study aims to evaluate the effect of Lianol supplementation in multiparous Iberian sows during the maternal phase on pre-weaning piglet growth and survival. Treated sows (n = 20) received Lianol (1.5 Kg / Ton of concentrate) from approximately 19 days pre-partum until weaning (approximately 29th postpartum day). The remaining sows (n = 22) were used as Controls. Body condition of sows was evaluated by ultrasonography at the entry to the farrowing unit and at weaning. Ultrasound scanning was performed on the inter-scapular, sacral and gluteal regions. Treatment did not induce significant differences in total born or born alive numbers. However, Treated sows had significantly less stillborn and heavier 4-day old piglets. This might suggest a greater fetal survival rate at the end of gestation, because Lianol treatment started 10 to 27 days before farrowing, instead of the approximately 7 days reported in prior studies. In contrast, the remaining pre-weaning productive traits of the piglets did not yield conclusive results that could suggest any effect of Lianol along the lactation period. The remaining treatment effects on litter traits only reached significance for the treated subgroup having the longer prepartum treatment (20-27 days; n = 10), i.e., piglet weight at birth and weaning, and total litter weight at weaning. Maybe as a consequence, this treated subgroup, but not the other one (n = 10), lost more fat cover and gluteus muscle thickness than Control sows during lactation. Therefore, the purported effects of Lianol during lactation may be exerted mainly during late fetal development and, thus, the other effects may be due to a greater litter homogeneity at term. Finally, this reproductive effect may have important applications for swine production.

Keywords: Iberian pig, fetal survival, perinatal mortality, piglet growth, body condition score

COMPARISON OF FATTY ACID PROFILE OF DIFFERENT TYPE OF PIGS (MEAT AND FAT-TYPE) FED SAME COMPOSITION OF DIET

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The experiment aimed to find differences in the fatty acid pattern of the loin eye and backfat of pigs of different genotype reared among identical housing and nutritional conditions. In the trial modern swine breeds were compared with Swallow Bellied Mangalitza breed. To assess the influence of genotype on fatty acid pattern of loin-eye and backfat, samples were taken from 59 individuals of different genetical background. The experimental individuals were from 6 breeds or genotypes, such as Hungarian Large White, Hungarian Landrace, Duroc, Pannon Hybride, "Hungahib – 39", and Swallow Bellied Mangalitza.

As the saturated fatty acids, the highest levels were found in the fat of loin-eye samples of Hungarian-Landrace, whereas the lowest in the Hungarian Large White pigs. In the other genotypes nearly the same levels were found. The ratio of saturated fatty acids in the fat of loin-eye samples was lower in Hungarian Large White pigs (36.8±2.5%) than in that of Hungarian Landrace (40.4±3.1%), duroc (41.2±1.3%) and Swallow Bellied Mangalitza (40.9±2.7%) breeds and in the two hybrides (38.2±1.6% in Pannon and 39.3±1.8% in Hungahib 39). Highest proportion of palmitic acid was found in the Swallow Bellied Mangalitza (26.4 ±1.5%), in Duroc (25.6 ±0.6%) and in Hungarian Landrace (25.3±1.8%). Among the genotypes studied, the ratio of stearic acid in loin-eye fat was high in duroc (13.4±1.1%), Hungarian Large White breeds (13.1±1.6%) and in Hungahib 39 (13.2±0.9%) hybride. Oleic acid proportions were higher in the fat of loin-eye samples of Swallow Bellied Mangalitza (44.5 ±1.6%), next to that in Duroc (37.1 ±5.3%) breed. They were nearly the same in the other genotypes examined. As the ratios of polyunsaturated fatty acids in the samples of different genotypes, it could be stated that values of Swallow Bellied Mangalitza (10.2±3.5%) were inferior to those in others markedly. Low levels were still found (17.7±6.4%) in samples from Duroc individuals. Polyunsaturated fatty acid ratios in the other breeds were above the overall mean value (19.6±6.9%) of the total of the analytical data. Analyzing the deviations from mean values proved that ratios of polyunsaturated fatty acids in loin-eye samples of the Swallow Bellied Mangalitza were in each case lower than means in other genotypes. The data obtained suggest that among identical conditions in housing and nutrition, the fatty acid pattern in tissues of Mangalitza breed is significantly different from that of other breeds.

It may be presumed, that among the breeds the differences found in identical tissue-types are really not genetically determined. Rather the lipid fractions of different functions and compositions are represented in different extent in the total tissue lipids, in this way generating the differences in fatty acid pattern. A separate analysis of membrane lipids and storage lipids in each genotypes would merit further investigation.

COMPARING GENETIC EVALUATIONS FOR CARCASS AND MEAT QUALITY TRAIT OF HEAVY IBERIAN PIGS FATTENED IN TWO DIFFERENT FREE-RANGE SYSTEMS

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Iberian pigs are produced in a range of low, medium and high input production systems, all them focused on obtaining meat and dry-cured products characterized by their high sensorial quality. The most traditional production system (*montanera*) includes a finish-fattening period of about four months based on the *ad libitum* intake of acorns and pastures. However this kind of fattening system is minority, approximately a 25-30% of the production, and most of the Iberian pigs are fattened using commercial feeds. A medium input production system has been recently developed, which also makes use of the territory (free-range rearing) with free availability of grass or stubble but mainly fed with concentrate. This system is called *campo* (field's pig). The present study is aimed at comparing the genetic evaluations of Iberian reproducers for traits of most economic value (carcass conformation and intramuscular fat content) based on relatives with records from these two outdoors systems. For this purpose, two databases are available coming from the official breeding program developed by the Spanish Association of Iberian Pig Breeders. The first one (*montanera*) contains records from 4,842 pigs born in 46 herds since 1993, and the second one (*campo*) contains records from 1,952 pigs born in 29 herds. All the animals were slaughtered at approximately 160 kg of body weight. Genetic parameters and individual breeding values for percentages of hams, shoulders, loins and intramuscular fat content were separately estimated in both datasets using a multitrait animal model fitting batches and Iberian pig varieties as systematic effects, and the carcass weight as covariable. The heritabilities are clearly different in both systems, with values significantly larger in the *campo* system ($h^2 = 0.37 - 0.53$) than in *montanera* ($h^2 = 0.24 - 0.38$), due to the higher dispersion of environmental conditions (orography, climate, food availability) in this system. The values of genetic correlations in both systems are similar between the percentages of premium cuts. Some minor differences are appreciated for the correlations between intramuscular fat content and the different premium cuts percentages. The values of Pearson correlation between EBVs of 20 sires with offspring slaughtered in both production systems were moderate for percentages of hams (0.33), shoulders (0.43) and intramuscular fat content (0.41), and negligible for the percentage of loins (-0.13). These values provide a rough view of the possible genotype x production system interactions. The values of Kendall tau rank correlation (0.22, 0.41, 0.09 and -0.16) reflect some changes of position in the genetic rankings for the correspondent traits. Economics values for premium cuts and for fat content, this last calculated applying optimum traits theory, are also different in each system, mainly due to the higher prices of products from *montanera* pigs.

PREDICTION OF MEAT CUT WEIGHTS AND YIELDS FROM IBERIAN PIGS BY ULTRASONOGRAPHIC *IN VIVO* DETERMINATIONS

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The objective of this study was to predict the weights and yields of economically important meat cuts in Iberian pigs by analyzing real-time ultrasound images collected before slaughtering. Two hundred and forty one Iberian pigs were fed up to 160 kg of live weight. One day before slaughtering, ultrasound images were collected by using an Aloka 500 scanner coupled to a 3.5 MHz probe of 12 cm of length. The scanned anatomical locations were the 10-11th rib intercostal space and right behind the last rib. The three backfat layers and the loin area were measured from the ultrasound images at these locations. At the packing plant, carcasses, hams, forelegs and loins were weighed, and the corresponding yields were recorded. Ultrasound measurements were combined in multi-regressive models to predict the weight (W) and yield (Y) of economically important cuts such as ham (H), foreleg (F) and loin (L), i.e., HW, FW, LW, HY, FY and LY. Measurements from images collected at the 10th rib level were better predictors than those obtained at the last rib level. These predictions were more accurate for the weights than for the yields. The corresponding prediction models had an R² of 0.48, 0.39, 0.24, 0.15, 0.14 and 0.33 and a Cp of 6.9, 0.47, 4.13, 3.56, 0.47 and 4.27 for HW, FW, LW, HY, FY and LY, respectively. In addition, the weight and yield of a combination of the three cuts were predicted with an R² of 0.62 for HFLW and 0.31 for HFLY and a Cp of 6.0 and 4.46, respectively. In conclusion, ultrasound measurements taken at the 10th rib level can be used to predict important meat cut weights. However, new anatomical locations at the upper zone of both the rear leg and foreleg should be investigated to try to increase the accuracy of prediction.

Keywords: Iberian pig, carcass traits, meat yield, backfat, ultrasound

LIPID PEROXIDE AND GLUTATHION REDOX STATUS OF LIVER, SPLEEN AND KIDNEY IN DIFFERENT GENOTYPES OF PIGS

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There were several researches during the last decades to investigate the genetic differences in the amount and/or activity of the glutathione redox system. Significant differences were found in some farm animal species including pig. However, there are few data about the lipid peroxide and glutathione redox status parameters in different tissues among the different pig genotypes, and in particular not about mangalitza. Purpose of present study was to investigate the possible genetic differences in the rate of lipid peroxidation as measured by the amount of malondialdehyde (MDA), reduced glutathione (GSH) content and activity of glutathione peroxidase (GSHPx) in the liver, spleen and kidney homogenates in some intensive pig breeds (Hungarian Large white [HLW], Hungarian Landrace [HL] and duroc) and two varieties of mangalitza (swallow-bellied [SWM] and blonde [BM]).

Finishing pigs (sex ratio 1:1) were fattened and fed with the same growing-finishing diet in a self-performance test. All of the animals were slaughtered at the body weight of 105±2 kg. Liver, spleen and kidney samples were taken at slaughtering.

Lipid peroxidation was measured based on the amount of MDA in tissue homogenate (nine-fold with isotonic saline) with thiobarbituric acid method. GSH concentration was analysed with Ellmann's reagent and GSHPx activity with end-point direct assay in the 10,000 g supernatant fraction of tissue homogenates. Statistical evaluation was carried out by Kruskal-Wallis non-parametric test.

MDA content did not differ significantly among genotypes in liver and spleen, but it was lower in kidney of BM as compared to HL and duroc. GSH content was significantly higher in liver of BM as compared to HLW, HL and duroc, and between SWM and HL, in spleen of BM as compared to all others, and in kidney of SWM and BM as compared to duroc. GSHPx activity was higher in liver of SWM as compared to HLW and HL, and in the spleen between BM and HL.

The results suggested that the higher GSH content in the analysed tissues would be the cause of the lower rate of lipid peroxidation as measured by MDA in mangalitza varieties as compared to the other genotypes. In conclusion the results of present study suggested that mangalitza has better antioxidant defence in the analysed tissues as compared to the other genotypes with the same nutrient supply.

PERFORMANCE TEST RESULTS OF SWALLOW BELLIED MANGALITZA COMPARED TO MODERN GENOTYPES

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Nowadays the various traditional pig breeds, such as the Hungarian Mangalitza are in the scope of the international researches. There are available performance results of these breeds, but most of the tests are based on outdoor keeping system, and so their results are not comparable with the data of the modern commercial genotypes tested in standardized indoor systems. In our research Swallow Bellied Mangalitza pigs were tested under intensive standardized conditions and that data compared with the results of commercial genotypes.

In our study the performance testing results of seven genotypes were compared: Hungarian Large White (HLW; n=18), Hungarian Landrace (HL; n=20), Duroc (D; n=14), Dalland Hybrid (Da; n=15), Pietrain (Pi; n=12), Pietrain x Hampshire F1 (Pi x HA n=18) and Swallow Bellied Mangalitza (MAN; n=8). Animals were submitted for testing between 27-30 kg, and slaughtered at 105±2kg. The test was conducted in the Performance Testing Station of the Hungarian Central Agricultural Office in Atkár. Data were collected during the fattening period - age at the beginning of the test (days), length of the fattening period (days), average daily weight gain (g/d), age at the slaughter (days) - and at the slaughter - carcass fat weight (kg), carcass fat %, weight of valuable cuts (kg), ratio of valuable cuts (%). Data were analyzed with SPSS 16.0 statistical program package. Variance analysis, Tamhane and Tukey tests were conducted. There were significant differences in the age at the beginning of the performance test. The age of the modern genotypes was almost similar. However, the average of the MAN (98.75 ±10.32 kg) was significantly higher (P<0.001). The average length of the fattening period of the whole tested population was 89±21.43 days, the fattening period of the MAN pigs was 154±15.41 days, which is significantly longer than measured for the modern genotypes (P<0.001). The average age of the MAN pigs at the slaughter was 233±54.75 days. The average daily weight gains of modern genotypes were between 810-1000 g/day, that trait for the MAN pigs (482.26±71.50 g/day) was significantly lower (P<0.001). The average of the hot and cold carcass weights of the Pi (83.28±2.75 kg and 81.03±2,80 kg) and MAN (83.21±1.95 kg and 80.94±3.55 kg) pigs were (P<0.05) higher compared to the other genotypes. The back fat of the MAN pigs was almost four times thicker, which is significantly higher than any of the other genotypes (P<0.001). The carcass fat % of the MAN pigs (51.45±3.23 %) was the highest, and the one of the Pi pigs the lowest (19.06±4.61%) in the studied genotypes. The average of the valuable cuts % of the MAN pigs (32.47±5.58%) was significantly lower, and the average of the Pi pigs (58.73±4.42%) was significantly higher than that of the other genotypes (P<0.001).

The main advantage our research is to get comparable data about the Swallow Bellied Mangalitza and the modern pig genotypes using the same intensive keeping system.

MANGALICA IS A UNIQUE MARKET NICHE – FOCUSING ON CONSUMER HABITS

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Mangalica is a type of meat sought after both in marketplaces and supermarkets. This is not an accident, even people not preferring pork buy it – the question is: why? Recently, in a survey conducted within the framework of the MANGFOOD project, consumption and purchasing habits of mangalica products were revealed, as well as attitudes related to the product, and the perceived healthiness of the meat.

In order to reach the primary goal, which was mapping out consumer behavior in the market of mangalica products, available information was collected first, and then focus group analyses were performed in 3 cities. This was followed by a nationwide questionnaire survey with the participation of 1200 consumers in May 2010.

The questionnaire survey showed that almost half (44,7%) of the responders consumes mangalica based foods with some frequency. We think that this is a very favorable fraction for a niche product. According to the survey, the main target group of the product are highly educated consumers performing intellectual work and living in major cities, mainly in the capital or its vicinity, or in the traditional manglica breeding regions of the Alföld.

The main cause for rejecting foods made of mangalica meat is the lack of familiarity with the products (16,3%), which suggest an opportunity to widen the circle of consumers. In the case of certain mangalica products, lower prices could be successful, because almost one sixth (15,6%) of non-consumers cited high prices for rejection.

Consumer opinions about mangalica were unequivocally positive. Responders deem the product traditional, they paint a picture of a high quality, healthy, environmentally friendly product of Hungarian origin. Mangalica based foods are essentially reliable products that are loved by consumers because of their tastiness.

Direct purchase from breeders, meat stores, and also bio and reformed food shops were listed as most reliable ways to buy mangalica products.

Like our other traditional national products, mangalica pig possesses unique, easily discernible characteristics and a special quality. Due to characteristics that are easy to judge by and its uniqueness this product has good market possibilities that should be exploited dutifully by the players of the Hungarian food industry. It is a very important observation for the formation of marketing and sales strategies that products of this breed possess outstanding advantages in terms of nutrition physiology, which should be a centerpiece of marketing communication, in line with the trend of conscious nutrition.

CRYOPRESERVATION AND GENE BANKING OF PORCINE OOCYTES; LIMITATIONS AND CHALLENGES

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In several domestic animal species, in vitro embryo production (IVP) combined with gamete cryopreservation has been proven to be a useful tool for the preservation of rare breeds. In pigs, although IVP using cryopreserved semen has been generally established, gene banking of porcine oocytes is still considered to be challengeable. In spite of recent attempts, live piglets from cryopreserved oocytes have not been obtained yet. In this study, we aim to present our experiences on pig oocyte cryopreservation which may be useful for future establishment of standard cryopreservation protocols for porcine oocytes of fatty pigs.

We have applied solid surface vitrification for pig oocyte cryopreservation because it enables the fast preservation of oocytes/embryos in large quantities with low financial cost. Vitrification of oocytes at the metaphase-II stage after in vitro maturation (IVM) resulted in reasonable survival rates (approximately 60%); however, the fertilization and developmental competences of matured oocytes is greatly reduced by vitrification. Antioxidant defense in oocytes have been proven to be compromised by vitrification. Moreover, vitrification induced spontaneous oocyte activation in nearly half of the survivors. As a result, in vitrified and fertilized oocytes, male pronucleus formation, cleavage and blastocyst formation rates were severely reduced. In contrast, when IVM oocytes were vitrified 10 h after in vitro fertilization, the survival and developmental rates dramatically improved. The transfer experiments of vitrified zygotes resulted in the production of live piglets.

On the other hand, vitrification of immature oocytes at the germinal vesicle (GV) stage resulted in lower survival rates compared with that of IVM oocytes. However, when they were subjected to IVM, the surviving oocytes had similar competence for nuclear, cytoplasmic maturation and fertilization to those of the non-vitrified control. Despite of reduced development rates, the quality of blastocysts were also similar to that of the control oocytes. Nevertheless the transfer of embryos generated from IVM/IVF of cryopreserved immature oocytes resulted in no live piglet.

Our results suggest that despite of reasonable survival rates vitrification at the metaphase-II stage may alter cytoplasmic ability to support male pronucleus formation in a manner that cannot be restored until sperm penetration. On the other hand, live oocytes vitrified at the GV stage seem to have some ability to recover from cryoinjuries during IVM; however this approach is still stricken with low survival rates. Low numbers of transferable embryos still greatly limit the success of this technology to produce live offspring.

Further improvements of oocyte cryotolerance are expected by chemically induced lipolysis and the prevention of cooling-induced activation process.

GENETIC, METABOLIC AND NUTRITIONAL FACTORS AFFECTING REPRODUCTIVE PHYSIOLOGY OF FATTY PIG BREEDS. STUDIES ON THE IBERIAN PIG

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The Iberian pig, like other Mediterranean fatty breeds, has been maintained scarcely selected throughout centuries in extensive production systems. In the case of the Iberian pig, in large herds clustered in the Southwest territory of the Iberian Peninsula, where those pigs traditionally graze evergreen oak and cork oak woodlands named *Dehesas* (with mainly *Quercus* genus trees). In their traditional extensive production system, Iberian pigs are exposed to continuous changes in food availability throughout the year. Thus, the breed has developed a *thrifty genotype* for accommodation to seasonal cycles of feasting and famine and the animals store excess fat during food abundance, which enables survival during scarcity periods. Iberian pigs show a high voluntary food intake and a great trend for fat accumulation and obesity when food is in excess. This abundance of fat causes an increased secretion of leptin when compared to lean breeds.

The hormone leptin is the link between nutritional state and reproductive function in a long-term fashion (glucose/insulin are the link in a short-term fashion) and is directly associated with mechanisms regulating attainment of puberty, fertility and pregnancy. In the Iberian pig, the abundance of fat and, therefore, the increased secretion of leptin during the juvenile period have been related to a significantly earlier onset of puberty than found in females of lean breeds reared under the same conditions.

However, the Iberian pig has a gene polymorphism of the *leptin receptor (LEPR)* with effects on food intake, body weight and fat deposition. Thus, Iberian *LEPR* alleles increase insatiability and pigs become more and more obese in abundance of food. This situation, also identified in obese human beings, is so-called *leptin resistance* in human medicine. In humans, polymorphisms for genes regulating *LEPR* have been linked to reproductive disorders in obese individuals. Similarly, the Iberian pig is also characterized by a lower reproductive efficiency, mainly a lower prolificacy, than lean breeds; deficiency which is increased with age and adiposity. Prolificacy is determined by ovulation rate and/or embryo viability. Different studies suggest that embryo viability is a more important factor than ovulation for limiting prolificacy of the Iberian genotype, due to deficiencies in implantation and embryo development which may be related to the proper syndrome of *leptin resistance*. But, moreover, Iberian pigs have an age-related metabolic sensibility to changes in nutritional balance, affecting glucose and lipid metabolism and predisposing breeding sows to hyperglycaemia and dyslipidemia in response to challenges in nutritional balance. Hence, disequilibrium in food quantity and/or quality during pregnancy may affect embryo viability and, thus, prolificacy. Similarly, deficiencies in food supply and/or composition during lactation may affect oestrus appearance after weaning.

DEVELOPMENT OF A MANGALICA BREED-SPECIFIC PCR-BASED DIAGNOSTIC SYSTEM

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The aim of our work is to enhance the competitiveness of Hungarian mangalica products by providing tools to detect adulteration and supplying information to build a comprehensive legal framework. The genomics of this special „hungaricum” pig breed is to be investigated with the help of the latest genome sequencing and molecular biological technologies, leading up to the development of a validated DNA-based analytical procedure to detect and quantify mangalica breed in foodstuffs, catering for the needs of the food industry and the control authorities to ensure traceability and ethical market behaviour.

One of the most important goals of the project is to develop a diagnostic protocol for the qualitative and quantitative determination of the ratio of mangalica bloodline even in mixed food materials.

To achieve this, we wish to choose such a method, with which the target sequence variation can be detected using a biochemical protocol. To choose the appropriate method, its specificity, sensitivity, ability for automatisation, quickness, capacity and the nature of the used DNA probes and primers will be crucial. A real-time PCR-based diagnostic method with TaqMan chemistry is the most feasible, because with this method the above mentioned criteria could be achieved.

During the development of this diagnostic tool we have to verify that the selected sequences and diagnostic tools are Mangalica-breed specific. This are confirmed by comparing the selected sequences with non-pig sequence databases and also in laboratory experiments. Cross reactions are be tested using samples form other species, such as bovine, poultry, wild boar, etc.

Selected sequences from the genomic studies will be used to design specific primer pairs and fluorescent probes for the developing of real time PCR-based protocols. The multiplication of short, 60 to 100 bp DNA portions is desirable, because in the case of such short target sequences, specific sequence detection can be possible even in the case of fermented and sterilised products. A set of reference materials in the form of sausages and salamis are prepared.

IDENTIFICATION OF SNPS ASSOCIATED TO THE MANGALICA BREED BY WHOLE GENOME SCAN

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In a close cooperation with the breeders and based on mitochondrial sequences and microsatellite analysis as well, we have selected 37 Mangalicas, (Blond, Swallow-Belly and Red) and 11 white animals from Duroc, Pietrain, Large White and hybrid breeds for a case/control study. The applied tool in the study was an Illumina porcine SNP chip.

This chip has a more or less uniform covering of the genome, providing us genotypes of more than 6200 loci in one individual. After quality check of the raw data, we have determined the probability of the association of the alleles with the 'case' group under different models.

In the statistical approaches our tests revealed more than 50 fixed SNP loci in the Mangalica genome constituting several haplogroups.

Using appropriate selection criteria among the loci of the chip and cross-validation of our findings we can i.) discriminate Mangalica from the other breeds, ii.) differentiate the three breeds of Mangalicas from each other, and iii.) offer an SNP based parentage testing tool in case of Mangalica.

The identified SNPs are good starting points to reveal DNA regions or possible pathways, which are playing role in the manifestation of the fatty phenotype. Other traits of Mangalica such as behavior, disease resistance or response to environment factors might also be associated to these loci.

A QUEST FOR GENOMIC MOLECULAR MARKERS IN MANGALICA USING SECOND-GENERATION SEQUENCING AND BIONFORMATIC STRATEGIES

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We aim to develop a validated DNA-based analytical method suitable to detect and quantify mangalica breed in foodstuffs. As a prerequisite, we study the genomics of the mangalica breed using genome sequencing, molecular biological and bioinformatic techniques in order to identify characteristic DNA patterns, genomic markers enabling to differentiate between mangalica and other pig breeds.

Based on microsatellite markers, a blond mangalica boar was selected for genome resequencing. We applied two second-generation sequencing technologies and obtained 478 Mb genomic sequence data from Roche/454 GS FLX Titanium runs while 11.2 Gb from two ABI SOLiD mate-pair runs. We mapped the sequence reads to the publicly available Duroc reference genome (Sscrofa9 and Sscrofa10 assemblies) using bioinformatics tools. Alignment and comparison of the mangalica sequences to the Duroc reference is expected to reveal differences between the two genomes: SNP sites (with limitations due to the low coverage), copy number variations (indels: insertions or deletions) and other structural variations. Identification of the different types of genomic variations necessitate the use of diverse bioinformatic approaches. We anticipated that indels would be well suited for marker development, therefore most of our efforts were aimed at finding indels of various lengths.

The 454 reads were used to search for short (4–10 bp) indels in low copy regions. Ends of sufficiently long 454 reads were treated as quasi paired ends to detect indels between them, allowing the identification of mid-length (20–100 bp) deletions and insertions. Short sequences from the two SOLiD mate-pair libraries (2 kb and 6 kb) proved useful in finding many potential long indels (up to several kilobases).

The potential genomic markers identified in mangalica by these bioinformatic strategies provide data for studying their polymorphisms in several pig breeds and in many individuals. Polymorphism of short indels is surveyed by a targeted resequencing approach (using the SOLiD system) while long indels are validated by conventional methods (PCR and Sanger sequencing). We plan to select the most promising markers and develop them into an analytical procedure suitable to distinguish mangalica tissue from that of other pig breeds.

EFFECTS OF PROLACTIN RECEPTOR GENOTYPE ON THE LITTER SIZE OF MANGALICA

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The aims of this study were to detect different alleles of the prolactin receptor (PRLR) gene and to examine their effects on the litter size of the indigenous Hungarian pig, the Mangalica. G1789A single nucleotide polymorphism (SNP) was investigated as a candidate for litter size. Samples from 80 purebred Mangalica sows and data of their 335 litters were provided by Olmos & Tóth Ltd. Hair follicles were used to isolate the required DNA. Allelic discrimination was performed by means of the polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) method using the *AluI* restriction enzyme and agarose gel electrophoresis. In the population examined, the A allele was found to be preferable in the Mangalica breed group. The most advantageous AA genotype was the least prevalent (8.75%), while the frequencies of AB and BB were 40% and 51.25%, respectively. Remarkably, the average number of piglets born alive per litter was 1.11 ± 0.39 higher in sows with AA as compared to those with BB genotype. By raising the frequency of the AA genotype, the litter size is likely to increase. However, the effect of PRLR genotypes can differ among pig breeds and even lines. Further studies may be required to observe and estimate possible pleiotropic effects of this polymorphism on other traits.

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