

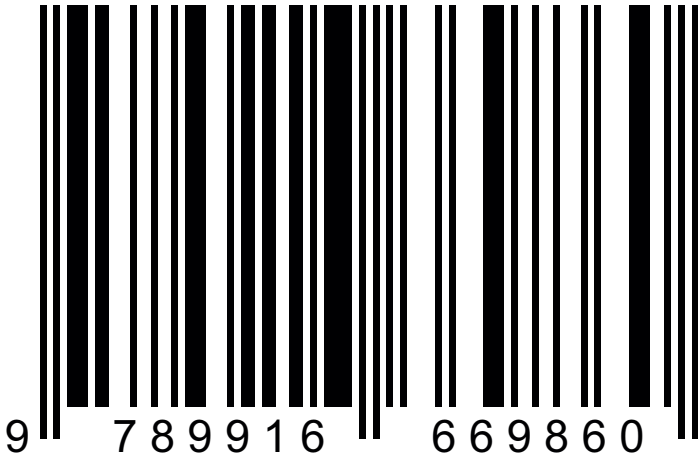


XIX BALTIC ANIMAL BREEDING CONFERENCE

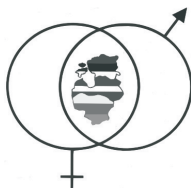
DECEMBER 14-15, 2022, TARTU, ESTONIA



ISBN 978-9916-669-86-0



9 789916 669860



Book of Abstracts

XIX BALTIC ANIMAL BREEDING CONFERENCE

DECEMBER 14-15, 2022, TARTU, ESTONIA

Organizer:

Estonian University of Life Sciences
Institute of Veterinary Medicine and Animal Sciences



Eesti Maaülikool

Estonian University of Life Sciences

www.emu.ee

Compiled and edited by:

Haldja Viinalass, David Arney and Alo Tänävots
Estonian University of Life Sciences
Institute of Veterinary Medicine and Animal Sciences

ISBN: 978-9916-669-86-0

ISBN: 978-9916-669-87-7 (pdf)

Printed by: Vali Press OÜ

Visit <https://babc.emu.ee/>



European Union
European Regional
Development Fund



Investing
in your future

Estonian University of Life Sciences
ASTRA project

„Value-chain based bio-economy 2“

Organizing Committee

Chair

Haldja Viinalass – Chair professor, Chair of Animal Breeding and Biotechnology, Institute of Veterinary Medicine and Animal Sciences of Estonian University of Life Sciences

Members

Toomas Tiirats – Director of Institute of Veterinary Medicine and Animal Sciences of Estonian University of Life Sciences

Tanel Kaart – Professor, Institute of Veterinary Medicine and Animal Sciences of Estonian University of Life Sciences

Alo Tänavots – Senior Lecturer, Institute of Veterinary Medicine and Animal Sciences of Estonian University of Life Sciences

Merko Vaga – Researcher–postdoctoral fellow, Institute of Veterinary Medicine and Animal Sciences of Estonian University of Life Sciences

Scientific Committee

Chair

Haldja Viinalass – PhD, Estonian University of Life Sciences

Members

Rasa Nainiene – PhD, Animal Science Institute of Lithuanian University of Health Sciences

Ruta Šveistiene – PhD, Animal Science Institute of Lithuanian University of Health Sciences

Diana Ruska – PhD, Latvia University of Life Sciences and Technologies

Līga Paura – PhD, Latvia University of Life Sciences and Technologies

Tanel Kaart – PhD, Estonian University of Life Sciences

Programme

The official language of the conference is English.

Wednesday, 14th December 2022

Estonian University of Life Sciences, Fr.R.Kreutzwaldi 1a, Tartu

9.00-10.00	Welcome / Registration	
10.00-10.15	Mait Klaassen (EE)	Opening. Estonian University of Life Sciences
10.15-10.35	Gita Jansone (LV)	Agriculture in Latvia
10.35-10.55	Haldja Viinalass (EE)	Agriculture and Livestock Sectors in Estonia
10.55-11.15	Līga Paura (LV)	Inbreeding evaluation in Latvian local breeds
11.15-11.35	Ruta Šveistiene (LT)	Animal genetic studies in Lithuania and their impact on the breeding programs
11.35-12.05	Coffee break/ Poster session	
12.05-12.35	Marija Špehar (HR)	Opportunities of implementing the genomic selection in small populations - the Croatian case
12.35-12.55	Tõnu Põlluäär (EE)	Description of the Estonian dairy herd based on genomic breeding values
12.55-13.15	Šarune Marasinskiene (LT)	Herd management perspectives of Lithuania dairy cattle breeds
13.15-14.00	Lunch break	
14.00-14.25	Andres Valdmann (EE)	The charm and pain of high milk yield and large farms
14.25-14.45	Elina Mark (EE)	Advanced reproductive biotechnologies in animal breeding
14.45-15.00	Inga Merkelyte (LT)	Management of cattle reproduction process by using digitized analysis systems for animal physiological parameters
15.00-15.15	Anni Enn (EE)	Work accidents in Estonian agriculture
15.15-15.40	Coffee break/ Poster session	
15.40-15.55	Ilva Trapina (LV)	The difference of Latvian breed rams in terms of feed efficiency as opportunity for genomic selection
15.55-16.10	Evaldas Šlyžius (LT)	Influence of genotypic factors on the Lithuanian dairy goat population
16.10-16.25	Ragnar Leming (EE)	The effect of feeding black soldier fly larvae in a low protein diet for growing pigs
16.25-16.40	Erkki Sild (EE)	Differences in inbreeding in Estonian horse breeds revealed by genomic analysis
16.40-16.55	Alma Rackauskaite (LT)	Genetic variability of Lithuanian sport horse populations assessed by pedigree analysis
16:55-17.10	Merko Vaga (EE)	Farm specific effects on twinning in Estonian dairy cattle
Closing		
19.00-22.00	Social Evening	Tartu Nature House, Lille 10, Tartu

Poster Presentations

D. Jonkus, L. Cielava, D. Ruska	The 100 years with Latvian Brown local origin dairy cow
D. Kairiša, I. Vircava, A. Valdovska, S. Meškis, L. Proškina, N. Bergmanis, U. Veide	Feeding dietary supplements of sapropel and its sodium humate to heifers of the Holstein black-spotted breed
L. Lutter, E. Songisepp, H. Viinalass	Using non-traditional starter cultures to valorize the milk of local breed cattle through the creation of innovative dairy products
A. Nolberga-Trupa, D. Ruska, G. Grandbergs	The effect of potassium humate on productivity and milk quality of dairy cows
I. Sematovica, I. Kanska	Cow oocyte quality in relation to milk SCC and the way of obtaining them
I. Muižniece, D. Kairiša	Carcass quality of beef breed cattle and their crossbreeds slaughtered in Latvia
D. Kairiša, D. Gudra, M. Ustinova, I. Kalnina, D. Galina, D. Jonkus, A. Šneidere, D. Fridmanis, A. Valdovska	Genetic relatedness of Latvian Darkhead breed sheep and analysis of milk
V. Nikonova, D. Jonkus, L. Paura	Analysis of inbreeding and effective population size of Latvian heavy warmblood horses
D. Barzdina, L. Proškina	Effect of sodium humate on the growth performance and carcass quality of broiler chickens
F. Carnovale, H. Viinalass, D. Arney	Sustainable adaptation of Estonian livestock production to climate change
D. Ruska, D. Jonkus, D. Kairiša, L. Paura, L. Degola, A. Nolberga-Trupa, E. Aplocina, D. Barzdina, I. Muižniece, L. Cielava, I. Eihvalde, V. Nikonova, I. Klavina-Blekte	Importance of breeding data in estimation of emission from livestock

THURSDAY, 15TH DECEMBER 2022

Technical tour. Departure at 9:00 Technical tour

1. **Gamina Stud**, Kūlitse, Tartu county
2. **Kõo Agricultural Enterprises** (Mangeni PM OÜ, dairy farm)
Kõo, Viljandi county
The new dairy complex was opened in November 2022. Cattle in different life cycles move from barn to barn in the same complex.
The Mangen farm complex will be home to 3,966 animals, nearly half of which are dairy cows. In 2021, 19,079 tons of milk were produced.
- 3 **Lunch**
4. **Kõpu PM** (dairy farm), Kõpu, Viljandi county
The company breeds cattle of the Estonian red breed. The farm was the first in the Baltics to introduce robotic watering of calves.

Table of Contents

Foreword	7
<i>Š. Marašinskiene, R. Šveistiene, V. Juškiene</i> Herd management perspectives of Lithuanian dairy cattle breeds ...	8
<i>A. Waldmann, M. Valdmann</i> The charm and pain of high milk yield and large farms	10
<i>I. Merkelyte, A. Siukscius</i> Management of the cattle reproduction process using digitized analysis systems for animal physiological parameters	12
<i>I. Trapina, D. Kairisa, N. Paramonova</i> Differences in Latvian breed rams in terms of feed efficiency as an opportunity for genomic selection	14
<i>E. Šlyžius, L. Anskiene, R. Bižiene, G. Palubinskas, L. Lauciene, V. Juozaitiene, B. Šlyžiene</i> Influence of genotypic factors on the Lithuanian dairy goat population .	16
<i>R. Leming, R. Patune, V. Vare</i> The effect of feeding black soldier fly larvae in a low protein diet for growing pigs	18
<i>E. Sild</i> Differences in inbreeding in Estonian horse breeds revealed by genomic analysis	20
<i>D. Jonkus, L. Cielava, D. Ruska</i> The 100 years with Latvian Brown local origin dairy cow	22
<i>D. Kairiša, I. Vircava, A. Valdovska, S. Meškis, L. Proškina, N. Bergmanis, U. Veide</i> Feeding dietary supplements of sapropel and its sodium humate to heifers of the Holstein black-spotted breed	23
<i>L. Lutter, E. Songisepp, H. Viinalass</i> Using non-traditional starter cultures to valorize the milk of local dairy breeds through the creation of innovative dairy products	24
<i>A. Nolberga-Trupa, D. Ruska, G. Grandbergs</i> The effect of potassium humate on productivity and milk quality of dairy cows	25

<i>I. Sematovica, I. Kanska</i> Cow oocyte quality in relation to milk SCC	26
<i>I. Muižniece, D. Kairiša</i> Carcass quality of beef breed cattle and their crossbreeds slaughtered in Latvia	27
<i>A. Tānavots, A. Meltsov, K. Kerner</i> Effect of beef cattle breed on finishing performance under coastal pasture conditions	28
<i>D. Kairiša, D. Gudra, M. Ustinova, I. Kalnina, D. Galina, D. Jonkus, A. Šneidere, D. Fridmanis, A. Valdovska</i> Genetic relatedness of Latvian Darkhead breed sheep and analysis of their milk	29
<i>A. Pöldvere, R. Laanemaa, A. Tānavots, A. Hellenurme</i> Effect of Duroc breed on meat quality of pigs	30
<i>A. Tānavots, J. Kreela, A. Pöldvere, A. Hellenurme</i> Culling reasons for AI boars	31
<i>A. Tānavots, J. Kreela, A. Pöldvere, A. Hellenurme</i> Managing boars in an artificial insemination centre	32
<i>V. Nikonova, D. Jonkus, L. Paura</i> Analysis of inbreeding and effective population size of Latvian heavy warmblood horses	33
<i>D. Barzdina, L. Proskina</i> Effect of sodium humate on the growth performance and carcass quality of broiler chickens	34
<i>F. Carnovale*, H. Viinalass, D. Arney</i> Sustainable adaptation of Estonian livestock production to climate change	35
<i>D. Ruska, D. Jonkus, D. Kairiša, L. Paura, L. Degola, A. Nolberga-Trupa, E. Aplocina, D. Barzdina, I. Muižniece, L. Cielava, I. Eihvalde, V. Nikonova, I. Klavina-Blekte</i> Importance of breeding data in estimation of emissions from livestock	36

Foreword

Dear colleagues,

On behalf of the Organizing Committee, I am pleased to invite you to attend the XIX Baltic Animal Breeding Conference that will be held in Tartu, Estonia, at the Estonian University of Life Sciences from December 14-15, 2022.

The recent pandemic has shown us that our sector never stops, that animal production continues to produce food for us and that we are an essential part of society. In 2022 we will surely be under the economic and societal consequences of this pandemic and the changed situation in the world.

This year's Baltic Animal Breeding Conference is already the 19th. The Baltic Animal Breeding Conference, which has taken place over the years, will give us an opportunity to exchange information and new ideas, and will encourage the development of further fruitful collaboration and networking. The conference will present ideas of what animal husbandry researchers and lecturers in the Baltic countries are currently doing.

The conference is planned in a traditional way: a plenary session in the morning and a species session in the afternoon on December 14th, followed by a technical tour on December 15th.

The programme will cover various areas of animal production and the topics will be filled with innovation and recent scientific results in animal production.

As a community, we must make up for the lost opportunities for face-to-face networking.

Happy listening, nice meetings and flying ideas!

Prof Haldja Viinalass

Chair of Organizing Committee

Herd management perspectives of Lithuanian dairy cattle breeds

Š. Marašinskiene , R. Šveistiene, V. Juškiene*

Lithuanian University of Health Sciences, Institute of Animal Science R. Žebenkos str. 12, Baisogala, Radviliškis distr., Lithuania

The roles of herd management and herd health are becoming increasingly important and have to meet the challenges of balancing high yield with reproductive performance and rearing healthy animals over their entire life. The aim of this study was to derive economic values (EV) for production, fertility, calving, and survival of cows and calves and assign importance of health traits to the EVs for three Lithuanian cattle breeds: Lithuanian Black-and-White Open Population (LBW), Lithuanian Red Open Population (LR) and Lithuanian Red Old Genotype (LROG). The stochastic bio-economic model SimHerd, which simulates the expected monetary gain in dairy herds, was used. The simulation model was calibrated for the three breeds, considering breed-specific phenotypic and economic data from the Annual Report of Milk Recording of Lithuanian breeds. For each trait, two scenarios were simulated with a respective trait at different phenotypic levels. To obtain the EV, the scenarios were compared with each other in terms of their economic outcomes. In order to avoid double counting of effects, the economic outcome was corrected using multiple regression analysis. The EVs were derived for the traits related to production, fertility, calving traits, calf survival, cow survival and direct health. The highest EVs for direct health traits, with an increase in 1 percentage point, were those found for mastitis (EUR 1.64 to EUR 1.82 per cow-year) and lameness (EUR 1.07 to EUR 1.27 per cow-year). The highest economic losses from dystocia were estimated for LROG (EUR -1.32), and were slightly lower for LBW (EUR -1.31) and LR (EUR -1.23). The results show the importance of health traits on the economic features of a cattle herd, also the importance of selection of new breeding goals and improvement of herd health.

The charm and pain of high milk yield and large farms

A. Waldmann, M. Valdmann*

Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences, Fr. R. Kreutzwaldi 62, 51006 Tartu

Phenotypic average increase of milk yield from 2007 to 2021 in Estonian Holstein breed (EH) cows was 254 kg per year, which is the highest in the world. In 2021, the milk yield for EH cows was 10,761 kg and the projected average annual milk yield will exceed 13,000 kg in 2030. At the same time there will be 50% fewer dairy farms by 2030, but the herd size will increase. Cows in larger herds have higher milk yields compared with cows from smaller herds. Larger, high producing herds, have lower operating costs and are therefore more cost-effective. Economic uncertainty mirrored by low and volatile milk prices can be the main drivers for the decline in the number of smaller herds. At present 71% of dairy cows in Estonia are in herds of more than 300 cows, which make up 1/5 of all herds. In Estonia 75% of the milk is produced in herds with more than 300 cows, and eight herds exceeding 1,200 cows produce 18.1% of the total national milk production. Thus, only 44 herds with more than 1,200 cows are needed to produce all the milk in Estonia. Due to increases in milk yield, methane emissions per unit of milk produced in Estonia have fallen by 50% in the last 20 years. The major problem to be solved is declining dairy cow longevity, which is largely caused by health and fertility problems. About 50% of dairy cows have calving-related disorders and/or clinical diseases and on average 30% of dairy cows experience cytological endometritis. Our recent research has demonstrated that the far-reaching consequences of clinical diseases on fertility and culling can be largely mediated through the development of cytological endometritis. Therefore, the mechanisms underlying why some cows in similar environmental conditions develop cytological endometritis and others do not need to be established. In conclusion, researchers, breeders, veterinarians and dairy farmers need to work together to find ways to breed and keep high-yielding cows so that they are healthy, fertile and stay in the herd for a long time.

Notes

Management of the cattle reproduction process using digitized analysis systems for animal physiological parameters

I. Merkelyte, A. Siukscius*

Lithuanian University of Health Sciences, Institute of Animal Science, Lithuania

Reproduction is one of the key indicators of good economic results in livestock production and successful development of this depends on good cattle fertility and calving results. Introduction of new advanced technologies might become a factor of importance for stability assurance in animal production. In beef cattle herds, it is very important to shorten the anoestrus period of cows after calving. Beef cows are characterized by the possibility of a longer anoestrus period and difficult oestrus identification by observation. Using a bolus integrated system, 50 cows were used to determine calving time and length, activity, average body temperature, calving index, average length of pregnancy, first oestrus, duration, and index of oestrus. Results indicated that the bolus system allowed determination of the beginning of the exact calving time for up to 90% of pregnant cows. The average activity index at calving was 7.06 and average pregnancy length was 286 days. The temperature of cows during calving was approximately 2% lower than the average temperature. The system captured oestrus earlier than 85 days after calving for up to 76 % of cows. If the cow was inseminated within this period, the optimum 365 days gap between calving could be achieved. The bolus system captured oestrus in periods of 22–30, 34–57 and 58–85 days for, respectively, 30, 30 and 16% of cows. Meanwhile, due to the low activity of the cows the first oestrus was not detected in 70% of cows using the oestrus visual observation method. The bolus integrated system also confirmed the fact that the first oestrus is less intensive. The average oestrus index was 62.79 at days 22–33 after calving and up to 75.57 at days 34–57 after calving. The system could give information on oestrus and calving more efficiently and accurately if the system were supplied with accurate and timely information about insemination and pregnancy determination.

Differences in Latvian breed rams in terms of feed efficiency as an opportunity for genomic selection

I. Trapina^{1*}, D. Kairisa², N. Paramonova¹

¹Institute of Biology of the University of Latvia, Genomics and Bioinformatics, Riga, Latvia; ilva.trapina@lu.lv

²Latvian University of Life Sciences and Technologies, Department of Animal Sciences, Jelgava, Latvia

Sheep (*Ovis aries*) farming, feed costs are the largest variable cost component. Breeders are showing an increased interest in breeding rams with better feed efficiency (FE) because of the possibility that the offspring will have a higher value for this indicator. Results show that for one ram, the progeny indicators tend to be variable. Currently, no marker has successfully explained enough of the variability of FE that they can be used as part of a routine improvement programme. The aim was to analyze FE for lambs from Latvian Dark-Head (LD) rams and to determine which of the rams produce lambs with a potentially higher FE. Fattening data were analysed for 48 lambs from 13 rams to determine heritability, phenotypic and genotypic correlation of FE indicators. The average birth weight of lambs was 4.08 ± 0.56 kg. The average gained weight was 47.43 ± 3.17 kg in an average time of fattening 73.27 ± 8.90 days. In rams of the LD breed, a high rate of heritability related to FE was shown, which indicates the great importance of the genomic selection of sheep.

Very strong phenotypic and genotypic correlations between all studied indicators were found; therefore it can be concluded that FE indicators have common phenotypic and genotypic effects. For phenotypic indicators one could add the environmental, and external signs, but the genotypic influence is at the DNA level, which needs to be studied further.

Funding statement. The study was funded by the LZP-2021/1-0489 project: “Development of an innovative approach to identify biological determinants involved in the between-animal variation in feed efficiency in sheep farming”.

Influence of genotypic factors on the Lithuanian dairy goat population

E. Šlyžius¹, L. Anskiene, R. Bižiene², G. Palubinskas¹, L. Lauciene³, V. Juozaitiene⁴, B. Šlyžiene⁵

¹Lithuanian University of Health Sciences, Faculty of Animal Science, Department of Animal Breeding, Kaunas, Lithuania

²Lithuanian University of Health Sciences, Faculty of Animal Science, Institute of Biology Systems and Genetic Research, Kaunas, Lithuania

³Lithuanian University of Health Sciences, Faculty of Veterinary Medicine, Department of Food Safety and Quality, Kaunas, Lithuania

⁴Vytautas Magnus University, Faculty of Natural Sciences, Department of Biology, Kaunas, Lithuania

⁵Small Community "Research Gamma", Kaunas, Lithuania

The aim of this study was to investigate the influence of genotypic factors on the Lithuanian dairy goat population. This research was carried out in Lithuanian herds of Saanen, Alpine and Czech White Shorthaired goats. Milk production was measured using an electronic milk flow meter (Lactocorder® WMB AG, Switzerland). Analyses of the amino acid and fatty acid (FA) compositions of goat milk were carried out using a SHIMADZU gas chromatographer. Statistical data analyses used SPSS 25.0 (SPSS, Inc., Chicago, IL, USA) software. Results were considered to be significant when $P < 0.05$. Analysis showed that the Czech White Shorthaired goats had from 20.45% to 44.48% higher milk yields compared with both the Saanen and Alpine goats ($P < 0.05$). The highest fat and milk protein contents were found in the milk of the Alpine breed goats: fat content by 0.66 % and protein content by 0.38% higher than the average of all investigated goats ($P < 0.05$). Comparison of CC, CG, GG genotypes of the goat AGPAT6 gene showed that goats with the CG genotype had higher milk yields, while goats with the CG genotype had higher protein contents ($P < 0.05$). The goat LPL gene with CC genotype had higher milk yields, but goats with the GG genotype produced milk with higher fat and protein contents ($P < 0.05$). Higher contents of essential and nonessential amino acids were found in the milk from the Alpine goat breed ($P < 0.001$). The individual fatty acids ranged between goat breeds while the total amount of SFA, UFA, and MUFA were not significantly different between breeds ($P < 0.05$). The milk yield, milking duration, milking flow rate and electrical conductivity of milk in the different phases of milking were significantly different between the breeds. This study showed that genotypic factors affect goat milk yield, composition and milking traits parameters.

Notes

The effect of feeding black soldier fly larvae in a low protein diet for growing pigs

R. Leming¹, R. Patune², V. Vare¹

1Estonian University of Life Sciences, Fr. R. Kreutzwaldi 1, Tartu 51006, Estonia

2Veskimäe PM OÜ, Viljandi County 69409, Estonia

The effect of feeding black soldier fly (*Hermetia illucens*) larvae on growth performance in growing pigs was investigated. Pigs were assigned to four treatments and were fed with either high protein (HP, 17% CP), low protein (LP, 15% CP), high protein supplemented with larvae (HP+L) or low protein supplemented with larvae (LP+L) diets. LP feed contained about 20% less soybean meal and 15-20% more rapeseed cake than the HP feed. Animals in HP+L and LP+L groups were fed additionally 25 grams live larvae per pig per day. In the first period (28 days) of the trial, the daily weight gain of the pigs fed larvae was lower, but in the second period (33 days), it was higher compared to the control (HP and LP) groups. Based on initial observations, it can be concluded that pigs like to eat live larvae, and this also reduced tail biting behaviour. The black soldier fly larvae can be considered as an alternative protein source for growing pigs.

Funding statement. The project was financed by the Estonian Agricultural Registers and Information Board through MAK 2014-2020 measure 16.2. Support for the development of new products, practices, processes and technologies.

Notes

Differences in inbreeding in Estonian horse breeds revealed by genomic analysis

Erkki Sild

Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences

The aim of the study was to use genomic data in the assessment of inbreeding in the Estonian horse population. For the study, 160 horses from Estonian Native, Estonian Heavy Draught, Tori, Hanoverian and Trakehner breeds were genotyped using the HD SNP chip (670K SNP Axiom Equine Genotyping Array). A run of homozygosity (ROH) analyses was the basis to estimate genomic inbreeding (F_{ROH}). Results showed that the average ROH size and ROH number per animal varied by breeds and across the genome. Predominating proportion of short runs of homozygosity indicated older inbreeding in the whole population. Horses of the local breeds (Estonian Native and Estonian Heavy Draught) tended to have less and shorter ROH-s than the international Trakehner and Hanoverian horses. The average genomic inbreeding F_{ROH} was 0.090 (ranging from 0.059 in Tori (universal type) to 0.149 in Trakehner). Surprisingly, modern Tori horses showed higher inbreeding values than universal Tori, despite the use of other breeds in modern sport horses. In addition, with the smallest population size, the Estonian Heavy Draught breed showed high genomic inbreeding that could cause rapid reduction of diversity and needs special attention in the conservation of their genetic variation. These findings could help breeders to manage the breeds' inbreeding more effectively.

Funding statement. The study was supported by the Estonian Research Council (PRG554) and Ministry of Rural Affairs project "Genetic analysis of the Tori horse breed and its subpopulations and populations of other local Estonian horse breeds and comparison of their similarities or differences".

Notes

The 100 years with Latvian Brown local origin dairy cow

D. Jonkus, L. Cielava, D. Ruska

Latvia University of Life Sciences and Technologies, Institute of Animal Sciences

This year (2022) marks 100 years since the Latvian Cattlemen Congress approved the Latvian Brown dairy cow breed and gave the breed mark LB. During the last century many generations have changed, however local LB breed cows have retained their valuable characteristics. They are durable in poorer feeding conditions, they have good longevity and high fat and protein content in their milk. The aim of the study was to analyze the milk productivity of local origin LB dairy cows in the 21st century. A database was created using the monitoring information collected by the Agricultural Data Centre for cows born between 2004 and 2018, and which by the end of 2021 had finished their 1st lactation, in total 3,432 standard lactations (947 first lactations). Depending on their year of birth, all cows were distributed in three time periods: in period 1 from year 2004 – 2007, (604 concluded lactations) the average milk yield was $3,975.1 \pm 37.33$ kg with a fat content of $4.40 \pm 0.02\%$ and protein content of $3.31 \pm 0.01\%$. The 2nd period cows (140 animals) were born from 2008 to 2011 and during the first lactation had $4,673.8 \pm 89.59$ kg average milk yield with $4.39 \pm 0.04\%$ milk fat and $3.34 \pm 0.02\%$ milk protein. In the 3rd period from 2012 – 2018 (199 cows) cow average milk yield was $4,487.7 \pm 71.85$ kg and this was significantly lower ($p < 0.05$) than in both the 1st and 2nd groups. However the average milk fat and protein content was significantly higher than in the previous periods; $4.64 \pm 0.04\%$ and $3.47 \pm 0.03\%$, respectively ($p < 0.05$). With each subsequent lactation, the average milk yield of the cows increased. Comparing the 5th lactation cows in the three periods, it was found that the average milk yield in the 1st period was $5,608.6 \pm 69.10$ kg ($n=232$), in the second period, it was $5,502.9 \pm 166.22$ ($n=57$), but in the third period it was $5,934.1 \pm 177.54$ kg, ($n=23$). These cows had the highest average fat ($4.94 \pm 0.15\%$) and protein ($3.42 \pm 0.07\%$) contents among the compared cows.

Funding statement. study was prepared within the Latvian Ministry of Agriculture project S425.

Feeding dietary supplements of sapropel and its sodium humate to heifers of the Holstein black-spotted breed

*D. Kairiša^{*1}, I. Virčava¹, A. Valdovska¹, S. Meškis¹, L. Proškina¹, N. Bergmanis², U. Veide²*

¹*Latvia University of Life Sciences and Technologies*

²*Ogres piens Ltd*

One of the natural sources of feedstuffs that is able to eliminate deficiencies in minerals, vitamins and organic compounds in livestock diets is sapropel, which is widely found in Latvia. Dietary supplements of sapropel and sodium humate derived therefrom into diets for Holstein black-spotted calves was tested by Ogres Piens Ltd. Three groups of calves were established on the farm, and the duration of the dietary experiment was 105 days. Control group heifers were fed the basic diet (hereinafter BD). In addition to BD, experimental group 1 heifers were fed a sapropel supplement (38 g of sapropel dry matter per day), while experimental group 2 heifers were fed a sodium humate supplement (3 g of sodium humate dry matter per day). Sodium humate was produced under laboratory conditions by enriching sapropel with NaOH. At the beginning of the experiment, the age of calves was in the range of 38.0±1.58 to 39.5±1.87 days, while their live weight was in the range of 66.5±2.77 to 69.8±2.5 kg. During the experiment, high live weight gains were observed in all experimental groups, exceeding 1.100 kg per day, and the highest live weight gain was observed in experimental group 2 (1.255 ±0.55 kg per day). Both the number of coliforms and the number of microorganisms of the Enterobacteriaceae family in the intestinal contents decreased, while the number of *Lactobacillus* spp. increased significantly in the heifers of the treatment groups, indicating that the inclusion of sapropel, and particularly the sodium humate supplements, into the diets of calves had a beneficial effect on the intestinal microbiota of the calves.

Funding statement. The research was done with the financial support of the project *Investigation of the application of innovative dehydration technology in the extraction of sapropel, possibilities of using sapropel based products in crop production and animal husbandry* implemented under the EU EAFRD and the Rural Development Programme of Latvia for 2014-2020 and supported by Ministry of Agriculture and Rural Support Service of Latvia, No. 18-00-A01612-000010

Using non-traditional starter cultures to valorize the milk of local dairy breeds through the creation of innovative dairy products

L. Lutter¹, Epp Songisepp¹, Haldja Viinalass²

¹BioCC OÜ, Riia 181A, EE 50411 Tartu, Estonia

²Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences, Fr. K. Kreutzwaldi 1, 51006 Tartu, Estonia, liis.lutter@biocc.ee

Over the last few decades, many local breeds all over the world have become endangered due to their substitution by high-yielding breeds. This, in turn, induces the loss of the conservation of the genetic diversity of local endangered breeds. Several European governments have initiated a national action plan for animal genetic resources based on global action plans aimed at the conservation and sustainable use of local breeds. In addition to the implementation of breeding techniques, a breed conservation programme should include production, market, and non-market values ensuring sufficient profitability of the breed. A way of making local endangered breeds more sustainable is to develop new innovative products and find a niche market for them. The development of distinctive products from the milk of local breed dairy cows creates the basis for the preservation of the genetic diversity of the breeds; including increasing the income and competitiveness of small local producers.

This study aimed at developing non-traditional starter culture combinations to valorize the milk of Estonian Native and Estonian Red breed cattle to create novel innovative dairy products. Non-traditional starter cultures were isolated from the raw milk of both breeds. Microbial isolates were identified with an API CHL 50 kit and MALDI-TOF. The raw milk isolates belonged to the genera *Lactobacillus*, *Lactococcus*, *Leuconostoc* and *Weissella*. Additionally, strains from the microbial collection of the research and development institution BioCC OÜ were used. The strains were analysed for their biochemical characteristics and the absence of antibiotic resistance; freeze-drying and fermentation trials were performed. The most promising strains having the best technological handling and their contribution to the development of desired organoleptic properties of fermented milk products were found from the *Lactococcus* and *Lactobacillus* species.

Funding statement. The implementation of the SAAREVEIS project is supported by Estonian Rural Development Plan (MAK) 2014–2020 measure 16.2 “Cooperation”, Support for the development of new products, practices, processes, and technologies.

The effect of potassium humate on productivity and milk quality of dairy cows

A. Nolberga-Trupa¹, D. Ruska¹, G. Grandbergs²

¹*Latvia University of Life Sciences and Technologies*

²*Peasant facility "Dukati"*

The growing demand of livestock farmers for food additives of natural origin in animal nutrition led to the research on raw materials from Latvian natural resources. The objective of this research was to create added value to agricultural products by testing of potassium humate, a new biologically active feed ingredient for dairy cows, and examining the impact of the new feed ingredient on cow productivity and milk quality. Trials were carried out on the farm "Dukati", Vitinu Parish, Auce Municipality. Holstein black and white cows were selected and assigned on the analogy principle (live weight, productivity, lactation phase) to two treatments groups, treatment and control. Each group consisted of 15 dairy cows where the cows were in different lactating phases (lactations 1–4), from 121 to 250 days of lactation. The housing and feeding conditions of the cows in the groups were the same; they received the same rationing of feed, but the amount of cattle fattening feed varied depending on production. The cows were kept untethered in a common space in the shed. The treatment group received potassium humate, which was offered at 7 g per day per cow in the animal feed that the cows received from the milking robot. The feed ration varied depending on the cows' milk yields and physiological condition and was adjusted monthly after the result of control milking. During the trial, the yield of the cows from the treatment group was 3.47 kg higher, on average, compared to the control group. In addition, differences in the yields of the treatment group showed an increasing trend ($p < 0.05$). The fat contents in the milk from both groups of cows tended to increase compared to the beginning of the trial. It should be noted that in the middle of the trial, in the case of the treatment group, the fat content of the milk was slightly higher than in the control group. At the end of the trial, compared to the beginning of the trial, the protein content in the milk of the experimental group was higher by 0.15%, and it was by 0.21% higher than in the milk of the control group ($p < 0.05$).

Cow oocyte quality in relation to milk SCC

I. Sematovica*, I. Kanska

Latvia University of Life Sciences and Technologies, Faculty of Veterinary Medicine, 8 K. Helmana Street, Jelgava, LV-3004, ilga.sematovica@lbtu.lv

The aim of this work was to evaluate oocytes obtained from different sources in the context of cow milk quality. A total of 889 oocytes were obtained. At the regular abattoir (RA) – 622 (36 cows), sanitary abattoir (SA) – 232 (17 cows) and 35 (6 cows) via *ovum pick up* (OPU) were collected from live cows. Morphological oocyte evaluation was made based on the following: category 1 had homogenous cytoplasm and a complete, compacted, multi-layered cumulus; category 2 – homogeneous cytoplasm with only a few areas showing irregular pigmentation, and the cumulus was at least 5 layers; in category 3 – cytoplasm was heterogeneous/vacuolated, *zona pellucida* was covered by 3–5 layers of cumulus cells except for small denuded areas, and category 4 – cytoplasm was heterogeneously pigmented, and cumulus cells were entirely or in significant part absent or expanded. Categories 1 and 2 were recorded as valuable oocytes. Data on cow milk SCC were obtained using the Agricultural Data centre of Latvia. A different oocyte number from cows was obtained (total \pm sd and valuable \pm sd) depending on the source: RA – 17.3 \pm 9.79 and 6.89 \pm 6.30; SA – 13.7 \pm 9.6 and 3.12 \pm 2.37; OPU – 5.8 \pm 5.98 and 3.17 \pm 4.34. More oocytes were obtained from the abattoirs than from OPU ($p < 0.05$). Higher productivity ($p < 0.05$) and SCC in milk were found in the SA cows (28.4 \pm 10.29 kg; 1366.1 \pm 1897.71) than in the RA cows (21.2 \pm 4.73 kg; 281.3 \pm 453.00, but the OPU cows were mostly heifers. SCC in milk was a significant factor regarding cow milk productivity and the number of valuable oocytes collected from cows ($p < 0.05$). In conclusion, it is important to evaluate lactating oocyte-donors' SCC in milk to get higher quality oocytes.

Funding statement. ERDF project was supported by the Ministry of Agriculture and Rural Support Service of Latvia No. 19-00-A01620-000094, "Preservation of Latvian native cow breeds' gene pool and reproduction of other breeds' individuals suitable to local conditions using OPU/IVF".

Carcass quality of beef breed cattle and their crossbreeds slaughtered in Latvia

*I. Muižniece, D. Kairiša**

Latvia University of Life Science and Technologies, Faculty of Agriculture, Institute of Animal Science, Liela Street 2, Jelgava, Latvia, LV-3001

The aim of this study was to explain the carcass quality of beef breed cattle and their crossbreeds according to the EUROP classification. Data for the study were obtained from the database of the Agricultural Data Centre Republic of Latvia, in the period from 2017 to 2021. Subclasses are also used to evaluate conformation and fatness of carcasses but were not distinguished separately in this study. Conformation of the obtained carcasses in 49.9% of cases was evaluated as R (good) and in 37.4% as O (fair). The remaining carcasses were evaluated as P (poor), U (very good), and E (excellent), 7.6%, 4.8%, and 0.2% respectively.

Bull and bullock carcasses were more muscled, the conformations of the bull (n = 12,369) and bullock (n = 274) carcasses respectively in 59.8% and 62.8% of cases were good, very good, or excellent (R, U, E). The good, very good, and excellent carcass conformation of heifers (n = 9,591) and suckler cows (n = 22,196) was in 50.4% and 54.2% of cases respectively. Carcasses of bulls and steers were evaluated as O and P classes in 40.2% and 37.2% of cases, but for the carcasses of heifers and suckler cows in these were 49.6% and 45.8% of cases, respectively.

Fat covers of carcasses were mostly slight (2nd fat class) and low (1st fat class), 42.8% and 24.3% respectively. Carcasses with average fat cover (fat class 3rd) were found in 20.1% of cases, but 12.8% of carcasses had high and very high fat cover (4th and 5th fat classes). Bull carcasses were leanest, 40.3% of carcasses were evaluated 1st class and 49.8% 2nd fat class. Cow carcasses were characterized by the greatest development of adipose tissue, 46% of the carcasses had from 3rd to 5th fat class evaluations. The quality of cattle carcasses slaughtered in Latvian slaughterhouses was from average to good. The carcasses of bulls and steers had better developed musculature, while the carcasses of cows and heifers had better developed fat coverage.

Funding statement. Financial support for this study was provided by the Latvia University of Life Sciences and Technologies, project Nr. 3.2.-8/57 "Beef cattle and their crossbreed suitability for fattening with grass forage".

Effect of beef cattle breed on finishing performance under coastal pasture conditions

A. Tānavots, A. Meltsov, K. Kerner

Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences

The study aimed to assess beef cattle breeds' performance when grazed on coastal semi-natural and natural pastures. The beef farm utilized a cow-calf-fattener system. Beef cattle were fed in the winter period with a total mixed ration (silage and straw) and cows, calves and heifers were grazed on semi-natural and natural pastures in the summer period. Youngstock were housed in the stable for fattening at six months of age where additionally grain was added to their ration. A total of 169 animals (Simmental (Si) 39.6%, Aberdeen-Angus (Ab) 35.5%, Hereford (Hf) 10.7%, Blonde d'Aquitaine (Ba) 7.3%, Charolais (Ch) 5.9%) at the age of 12–24 months were slaughtered in one slaughterhouse from 03.01.2021 to 18.10.2022. Gender distribution was 42.6 heifers and 57.4% bulls. Conformation grades were: U = 4, R = 3, O = 2. Results are presented as means \pm SD. PCA analysis revealed that the two French-origin breeds were separate from the others. They had better conformation (Ba 3.11 ± 0.90 , Ch 3.20 ± 0.63) and greater revenue was paid for their carcasses (Ba 1071.6 ± 315.9 , Ch 1279.3 ± 189.3 €) and their slaughter age was younger (Ba 17.46 ± 2.06 , Ch 17.80 ± 1.69 months). However, they had lower fatness grades (Ba 2.17 ± 0.79 , Ch 2.00 ± 1.15). The highest slaughter age was observed for the Hf breed (18.7 ± 2.69 months) and they also had the highest fat grade (3.71 ± 0.83). However, breed difference was somewhat affected by the gender of the animals as the Ba and Ch groups contained more bulls than the others. Females were slaughtered at an older age (19.6 ± 1.9) than bulls (16.5 ± 1.9 months) and their fat grade was higher (3.74 ± 0.92 and 2.36 ± 0.75 , respectively). The male carcass weight (296.5 ± 55.8 kg) was slightly higher than that for females (292.8 ± 58.8 kg). This means that the revenue from the carcass was also higher (949.3 ± 283.5 and 851.5 ± 239.4 €, respectively). Conformation grade was similar in both gender groups (males 2.87 ± 0.66 , females 2.76 ± 0.66). Therefore, the difference in meat performance between breeds was affected also by gender in addition to the breed.

Funding statement. The implementation of the SAAREVEIS project is supported by Estonian Rural Development Plan (MAK) 2014–2020 measure 16.2 “Cooperation”, Support for the development of new products, practices, processes, and technologies.

Genetic relatedness of Latvian Darkhead breed sheep and analysis of their milk

D. Kairiša, D. Gudra, M. Ustinova, I. Kalnina, D. Galina, D. Jonkus, A. Šneidere, D. Fridmanis, A. Valdovska*

¹Latvia University of Life Sciences and Technologies

²Latvian Biomedical Research and Study Centre

³SIA „Mikaitas”

The Latvian Darkhead breed (LT) is the local Latvian breed of wool-meat type sheep. It consists of ewes and rams belonging to seven genealogical lines of rams. The objective of genomic evaluations was to estimate the genetic value of an individual for a given trait (e.g., mastitis resistance, somatic cell counts) based on genomic information. For this purpose, a study was conducted on blood samples of rams and their daughters of the following lines – Edžina 0365, Irbja 015, Skara 0008, Sigara 0005, Apolona 0302 and Simana 0195. In total 40 samples were subjected to whole genome sequencing analysis – 8 sheep samples for deep sequencing yielding approx. 52.05x genome coverage, and 32 sheep samples for shallow sequencing yielding approx. 12.69x genome coverage. In total, we identified 18.6 million SNPs and 3.6 million indels, from which 263 thousand SNPs belonged to multiallelic sites. Assessing the genetic relatedness, results showed that the studied rams and ewes were genetically distant from each other. The closest individuals were ewes from the Skara 0008 ram's line. For analysis of the milk composition and somatic cell count (SCC) of ewes, 34 ewes were used within an average of 62 ± 5.3 day of lactation. Milk had averages of $6.58 \pm 1.27\%$ fat, $4.98 \pm 0.47\%$ protein (including $3.79 \pm 0.35\%$ casein) and $4.69 \pm 0.53\%$ lactose.

Average SCC was $1,260.1 \pm 5,031.8$ thousand cells/mL⁻¹. The main agents of mastitis – *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Staphylococcus chromogenes* and *Streptococcus suis* were identified in the milk of five ewes with a SCC above 500 thousand cells/mL⁻¹.

Funding statement. Latvian Council of Science project nr. lzp-2019/1-0075.

Effect of Duroc breed on meat quality of pigs

A. Põldvere¹, R. Laanema¹, A. Tänavots^{1,2}, A. Hellenurme¹

¹Estonian Pig Breeding Association

²Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Science

The study was carried out in 2022 with pigs belonging to the member farms of the Estonian Pig Breeding Association. Pigs were randomly selected for the experiment using the pig performance data collection program Possu. Landrace (L) and Large White (Y) breed crosses' (LxY 71; YxL 60) and their crosses with Duroc (DxLY 215; DxYL 122) carcasses were evaluated. YxL crosses carcass length did not differ from the D crosses (97.7 vs 98.2 cm). The carcasses of the LxY combination were longer (99.8 cm). No significant differences were found between the groups regarding the backfat thickness of the carcasses (18.4–19.8 mm). Fat tissue was more evenly distributed on the back, and belly thickness was higher, in the D crosses compared to the L and Y combinations. The carcasses of L and Y crossbred pigs had higher lean meat contents (LxY 59.4, YxL 59.1%) than those of the D crosses (DxLY 58.8, DxYL 58.6%). Most of the evaluated carcasses belonged to the S and E quality classes. Few D crosses' carcasses were assessed into the U class (DxLY 1.0, DxYL 7.0%). The *L. dorsi* mean pH₄₅ value determined after slaughter did not differ between groups, being 6.11–6.16. Since the share of the PSE-meat from L, Y and D crosses was relatively low (LxY 2.7, YxL 3.3, DxLY 2.8, DxYL 1.8%). D crosses grew faster (DxLY 663, DxYL 656 g/day) and reached slaughter age earlier (DxLY 166.0, DxYL 172.0 days), and their carcass weight (DxLY 76.8 and DxYL 81.2 kg) was similar to the L and Y crosses (LxY 615, YxL 645 g/day; LxY 182.2, YxL 174.9 days; LxY 80.7, YxL 78.4 kg). It is concluded that the evaluated pig carcasses had good technological properties. Boars of the D breed improved the fattening characteristics of the crossbred offspring. On the negative side, the carcasses of D crosses had a lower lean meat percentage.

Culling reasons for AI boars

A. Tänavots^{1,2}, J. Kreela¹, A. Põldvere¹, A. Hellenurme¹

¹*Estonian Pig Breeding Association*

²*Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences*

From an economic point of view, it is preferred that boars stay in the herd for as long as possible. The improvement in a pig's performance is fast due to the short generation interval, large litter sizes, and the application of genomic selection. Therefore, AI stations must find a balance between the economic side and the opportunity to provide farmers' boars with superior performance characteristics. The dataset contained culling reasons for the 133 boars culled from the AI station of the Estonian Pig Breeding Association between March 2019 and May 2022. Most of them were Duroc (D) boars (85), followed by the Landrace (L; 30) and Large White (Y; 18). Boars stayed in the AI station for an average of 14.7 months. However, age was the second highest culling reason for Landrace (L) boars (20%), fifth highest for Large White (Y; 10%) and sixth highest for Duroc (D; 4%). The intense muscle growth on the D boars has a negative impact on the health of their legs, especially the cartilage of the joints. The main culling reason recorded for D boars was problems with legs (39%) and for Y 28%. Only 7% of the L boars were culled due for this reason. One of the most common culling reasons of boars was aspermia (L 23, Y 17, D 32%). Boars can refuse to mount a dummy sow due to leg problems, which can cause pain or poor libido. It was found that 11% of the Y, and 13% of the L, boars refused to mount after providing at least one ejaculate and, respectively 6 and 10%, refused to mount at all. Mounting issues for D appeared with 4% of boars in both cases (with ejaculates or without). The third culling reason for D boars was sudden death (7%), caused by problems with internal organs, anaphylactic shock, or suffocation. L boars had issues with low sperm quality (motility, abnormalities *etc.*) (10%) or a low number of sperm in the ejaculate (7%). Y boars had higher cases of unspecified diseases (11%). The challenge for the AI station is to find a solution to the leg problems of the boars and to determine the causes of poor sperm quality.

Managing boars in an artificial insemination centre

Alo Tänavots^{1,2}, Jaanika Kreela¹, Arne Pöldvere¹, Anu Hellenurme¹

¹Estonian Pig Breeding Association

²Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences

The objectives of this study were to analyse some of the aspects of managing boars in the AI centre of the Estonian Pig Breeding Association. The dataset contained records of 133 culled boars between March 2019 and May 2022. Most of them were Duroc (D) boars (85), followed by the Landrace (L; 30) and Large White (Y; 18). Results are presented as means \pm SD. The first ejaculate was collected from the boars at the age of 220 ± 35 days. The youngest was D boars (216 ± 33 days), followed by L (221 ± 33 days) and Y boars (237 ± 44 days). The age for collecting the first ejaculate was more similar over the last three years and the variation between animals was also smaller. Economically it is profitable that boar stays longer in the herd as they then produce more ejaculates during their life span ($r = 0.907$, $P < 0.001$) and therefore, the total number of doses was higher. Longevity was higher for the Y boars (519 ± 180 days), followed by L (472 ± 242 days) and D (420 ± 194 days). The life span of the D and L boars decreased year by year. A total of 6,331 ejaculates were collected from 122 boars, from which 164,001 doses of semen were produced. This means that a mean of 51.9 ejaculates and 1,344 doses of sperm per boar were obtained; 23.6 ± 8.1 doses were produced per ejaculate. A similar number of ejaculates on average was collected from D and L boars (52.7 ± 37.4 and 52.6 ± 2.1 , respectively). The frequency of the ejaculates collection was 3.6 ± 0.80 per month; there was the highest frequency for the D boars (3.9 ± 0.68 ejaculates per month), followed by L and Y boars (3.2 ± 0.85 and 3.0 ± 0.51 ejaculates, respectively). A mean of 23.6 ± 8.1 doses of sperm were produced per ejaculate and the correlation between these was strong ($r = 0.909$; $P < 0.001$). The highest number of doses of sperm per ejaculate was 284 ± 8.5 for Y and the lowest for the L boars (20.3 ± 80 sperm doses per ejaculate). A mean of 23.8 ± 7.5 doses of sperm per ejaculate were obtained from the D boars. The results showed that a significantly smaller number of sperm doses per ejaculate were obtained from the younger boars (<10 months) compared to the older (>12 months) boars of all breeds.

Analysis of inbreeding and effective population size of Latvian heavy warmblood horses

V. Nikonova, D. Jonkus, L. Paura

Latvia University of Life Sciences and Technologies, Institute of Animal Sciences

Latvian warmblood horses are bred in Latvia. There are two types of this breed: the sport type and the heavy type, and the latter has been given the status of a local endangered breed due to the small number of these horses. The preservation of the heavy type of the Latvian warmblood horse (LSB) breed was started in 2004, when horses of different Latvia origin were selected. The aim of this study was to determine inbreeding and effective population size (N_e) of the LSB breed. Pedigree information was provided by the Latvian Agricultural Data Centre and the dataset included animals that were alive on June 1st, 2020, as well as ancestors from five generations. In total, the data set consisted of 3,098 animals, including 2,887 individuals with progeny, and 211 individuals with no progeny. The average pedigree completeness for 1st and 2nd generations were as high as 100% in 1985 and 2003, respectively. The average inbreeding coefficient for Latvian warmblood heavy type horses was from 0.62 to 2.25% during the last 10 years and varied by year of the animal birth. The proportion of non-inbred animals was 79.8%, and in 18.5% of animals the inbreeding coefficient did not exceed 5%. There were horses with inbreeding higher than 10%. In the last period, the effective population size of the heavy type of the LSB breed has decreased. Over the last ten years N_e has decreased from 163 to 103 animals in 2019. The decrease in the N_e can be explained by the decrease in the number of males (50 and fewer stallions) participating in the production of offspring in recent years. The increase in inbreeding per generation was 0.53%.

Funding statement. This research was supported by the Ministry of Agriculture of the Republic of Latvia, Project S378.

Effect of sodium humate on the growth performance and carcass quality of broiler chickens

D. Barzdina¹, L. Proskina²

¹LBTU, Faculty of Agriculture, Institute of Animal Science, dace.barzdina@lbtu.lv

²LBTU, Faculty of Economics and Social Development, Institute of Economics and Regional Development, 2 Liela iela, Jelgava, Latvia, liga.proskina@lbtu.lv

To improve the safety of food for human consumption, scientists need to develop new feeding strategies for poultry to reduce the risk of gastrointestinal diseases to the poultry and increase economic efficiency. Today, organic acids, plant extracts, enzymes, probiotics and prebiotics are used as growth promoters. Many research studies have tested various feed additives, among them humic substances included in the poultry diet. This research study was carried out at Valmiera Agro Ltd, in Latvia. The aim of the research study was to identify the effect of sodium humate on the growth performance and carcass quality of broiler chickens. The research study was conducted from May to June in 2021 and 2022. A total of 212 one-day-old cross Ross 308 broiler chickens of both sexes were bought from the joint stock poultry company 'Kekava'. The chickens were fed with a complete feed mixture *ad libitum*, which was bought from "KG Latvia". All feed and water samples were taken to the LBTU Biotechnology Research Laboratory for analyses. The broiler chickens were randomly divided into three groups: the control group (72 chickens) and two treatment groups of 70 chickens each. At the start of the research study, the broiler chickens were fed only basic feed and drank clean water for the first seven days. After an adaptation period of 15 days, the two treatment groups of broiler chickens drank clean water with added sodium humate (25 mL and 50 mL). The 2nd treatment group, which was fed 50 mL of sodium humate added to water, showed higher daily live weight gains (73.4 ± 1.15 g), feed conversion (1.50 kg) and carcass yields ($79.4 \pm 0.546\%$) than the control group and the 1st group. The inclusion of 50 mL sodium humate into water resulted in a 3.5% higher daily live weight gain throughout the fattening period, 83g or 5.6% lower feed consumption per kg of live weight and a 6.0% heavier carcass (2.04 kg) with the highest carcass yield (79.2%).

Funding statement. The research was done with the financial support of the project "Investigation of the application of innovative dehydration technology in the extraction of sapropel, possibilities of using sapropel based products in crop production and animal husbandry".

Sustainable adaptation of Estonian livestock production to climate change

F. Carnovale, H. Viinalass, D. Arney*

Estonian University of Life Sciences, Institute of Veterinary Medicine and Animal Sciences, Kreutzwaldi 1, 51006 Tartu, Estonia

The global average temperature in Europe, over the past ten years, has increased faster than was expected, on average it is 1.3 °C higher than the pre-industrial level, which means that warming in Europe has been faster than in the world on average. The multiple effects derived from global change are quite well known but not how to adapt livestock production to sustainable management of farms. The LIVECLIC: Sustainable Adaptation of Livestock Production to Climate Change is a project co-funded by the Erasmus+ program and is focused on climate change mitigation processes. The project is aimed at providing training to professionals operating in the agri-food sector, who often show a lack of skills related to the sustainable management of farms, as well as food consumers who should receive more information on their choices and habits, in ecological terms. Estonia, like most European countries, is trying to cope with and mitigate the problems verified with climate change, such as the Ministry of Environment in Estonia development of a plan for climate change adaptation: "Climate Change Adaptation Development Plan until 2030". The changed climatic conditions of the Baltic Sea, including the reduction in the extent and thickness of sea ice and increase in water temperature, affect all living organisms and the relations between them, so affecting biodiversity. In Estonia, there is a good potential for the production and export of food, energy as well as other bioeconomy products, due to there being twice as much arable land per person in Estonia than the average for the EU. The implementation of environmentally friendly plant cultivation and livestock farming technologies is a key issue for decelerating the emissions of greenhouse gases and ammonia, but also for adaptation. In agriculture, climate change mostly affects the selection of arable crops and varieties, their yield, the effectiveness, and productivity of livestock and the spread of plant pests and infectious animal diseases. Extreme weather conditions increase the risk of crop failure and may cause the death of farm animals due to power cuts and floods. LIVECLIC aims to develop training courses for the above-mentioned target groups in order to raise their awareness of sustainable growth, as well as to promote the exchange of best practices among the partner countries. Competencies will be related mainly to sustainable farming, the circular economy, and the green supply chain thus contributing to the sustainable adaptation of livestock production and its supply chain to climate change.

Importance of breeding data in estimation of emissions from livestock

*D. Ruska, D. Jonkus, D. Kairiša, L. Paura, L. Degola,
A. Nolberga-Trupa, E. Aplocina, D. Barzdina, I. Muižniece, L. Cielava,
I. Eihvalde, V. Nikonova, I. Klavina-Blekte*

*Institute of Animal Sciences, LBTU Faculty of Agriculture, Liela str. 2, Jelgava, LV
3001, Latvia, diana.ruska@lbtu.lv*

The goal of GHG and ammonia reduction from the livestock sector is an important ambition. To achieve emission reducing goals it is necessary to provide their estimation on a regular basis. For this evaluation the National inventory is used from the guidelines of the Intergovernmental panel on climate change (IPCC) estimation methods and coefficients (IPCC, 2019). More recently these coefficients are based on previous studies from countries with different conditions of climate, breeding, housing and management technologies than those in the Baltic region. Therefore, is very important to collect actual information at the national level directly from farms and also evaluate emission using this data. The aim of the project is acquisition, compilation and evaluation of data from reference farms for further use of these data in GHG and ammonia emission calculation models. The main sources of emissions from livestock are related to livestock productivity. Therefore, productivity data that we use for breeding evaluation are also used for estimations of emissions. Many production traits have been shown to have a genetic evaluation which can be used to reduce emissions e.g. milk yield and growth rates.

Funding statement. This project was conducted with support from the Latvia Ministry of Agriculture project No S428, agreement No 22-00-SoINV05-000016

Notes

Notes

