



28-29 September 2017



BOOK OF ABSTRACTS

14th International Symposium
of Animal Biology and Nutrition

National Research-
Development Institute
for Animal Biology and
Nutrition

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14th International Symposium of Animal
Biology and Nutrition
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Venue:

Ramada Plaza Bucharest
Str. Poligrafiei nr. 3-5, Sectorul 1
Bucharest, Romania, 013704

Organising committee

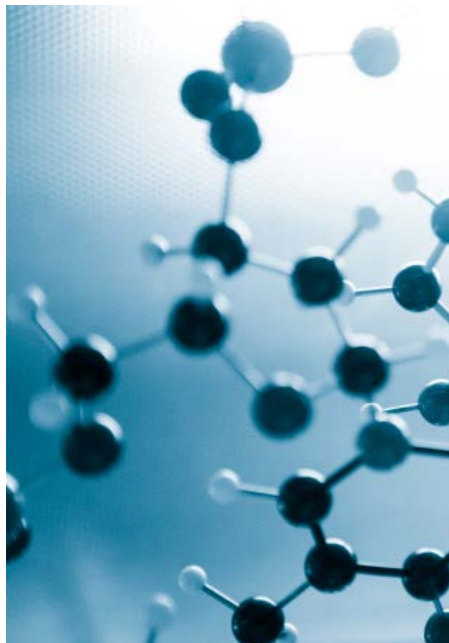
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Cell model in animal nutrition: an important tool for evaluating the bioactivity of feed components and additives

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Cell-based models in food and feed research allow testing bioactive compounds and additives under strictly control of chemical, physical and physiological conditions. Bioactive compounds from food and feed can be investigated considering several endpoints, such as cell proliferation, viability, epithelial integrity and gene-expression regulation, making the in vitro cell technology a complementary tool in nutritional and nutrigenomic research. The gastrointestinal tract is the primary target of bioactive molecules entering with food and feed. The identification of the effects of specific bioactive factors at the intestinal cell level give novel insight into promoting gastro-intestinal development and health. Among the intestinal models, HT29-MTX-E12 cells were extensively used to investigate the effect of bioactive peptides on intestinal cell proliferation and mucus production. Of note, protein bioactive were able to modulate the viability of the HT29-MTX-E12 cells and to exert trophic effects on the intestinal epithelia (Giromini et al., 2015) promoting the expression of MUC5AC. The mammary gland represents another target organ of considerable interest since secondary metabolites of food and feed may reach this tissue after intestinal absorption and transport, modulating milk production and mammary gland health. Mammary cell lines have been used for studying the effect of a number of bioactive food components, as milk peptides, growth factors, antioxidants as vitamin E, considering several endpoints such as cell metabolic activity, apoptotic body formation and gene expression. Among mammary cell lines, BME-UV1 resulted sensitive to mycotoxins and α -tocopherol significantly ($P < 0.05$) reduced the loss of ochratoxin A-induced cell viability by 10 % at 1 nM and the loss of aflatoxin B1-induced cell viability by 12% (Baldi et al., 2003; Baldi et al., 2004). Even though a large number of established cell lines from both the intestinal and mammary epithelium are commercially available, the development and validation of integrated in vitro systems, combining in vitro digestion protocol with the use of cell-based bioassays will permit higher physiological relevance in the evaluation of the bio accessibility, bioavailability and functionality of bioactive components and additives at specific target tissues.



Variations in cecum microbial composition among performance-tested Italian Landrace, Italian Large White, and Italian Duroc pigs

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The gut microbiota is crucial to sustain digestion function, intestinal immunity and host well-being. For this reason, the interplay between host genetics and gut microbiota has received notable attention in recent years. This study aims to investigate variation of microbial composition in relation to the host genotype. 125 cecum contents from Italian Landrace (ILA=33), Italian Large White (ILW=51), and Italian Duroc (IDU=41) performance-tested pigs reared at the genetic centre of the National Pig Breeders Association (ANAS) in Italy were analysed. The samples were collected immediately after slaughter, frozen and lyophilised. Total DNA was extracted and microbial composition determined by Next Generation Sequencing (Illumina HiSeq2000) of 16S rRNA gene fragments. Breed showed a significant effect on phylogenetic alpha diversity indices between ILA and ILW (InvSimpson and Shannon; $P < 0.03$), and between ILA and IDU (InvSimpson; $P = 0.04$). Considering beta diversity (weighted unifracc distance matrix), breed showed a trend of significance ($P = 0.07$). A slight separation of ILA samples and an overlapping of IDU and ILW breeds were visualized. No significant differences in the relative abundance of individual genera were observed between ILW and IDU samples; 15 genera were significantly different between ILW and ILA, and 12 taxa differed between ILA and IDU breeds. Genera that differed between ILW and ILA included commonly accepted health biomarkers such as Akkermansia, Faecalibacterium and various genus-level taxa belonging to the Ruminococcaceae family and Turicibacter and Lactobacillus genera. No significant variation of Akkermansia relative abundance was found between ILA and IDU. Our study showed that despite the absence of drastic variations in microbial composition among ILA, IDU and ILW, taxa having significant differences in relative abundance are generally acknowledged as important players of microbe-host interaction exerting an effect on overall health of the host.



Dietary *Cannabis sativa* L. (Hemp) seed meal improves oxidative stress response in sows and offspring

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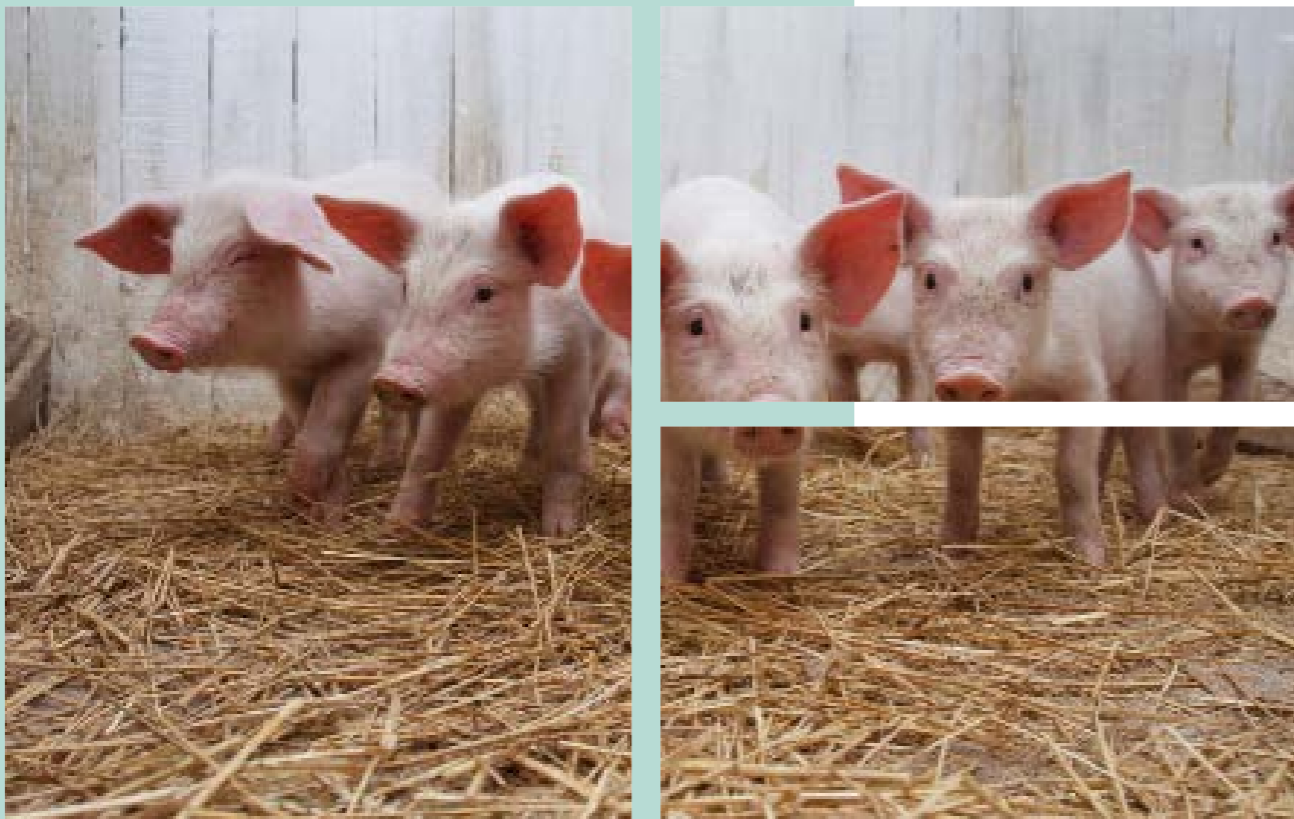
Cannabis sativa L. (hemp) seeds are rich in ω -3 polyunsaturated fatty acids as well as other bioactive compounds known for their health promoting effect on inflammatory responses and oxidative stress. In this study, the effect of diet including hemp seed meal was investigated in pregnant sow and their offspring during lactating period until weaning. 10 pregnant sows were divided into two groups and fed either a control diet (CD) or a Hemp diet (HD) containing 2 % hemp seeds meal for a period of 10 days before farrowing and 5% throughout the lactation period (21 d). The HD was fed to gestating sows starting at the 101st day of pregnancy. After farrowing, the resulting piglets (16) were allocated to the CD and the HD, respectively. Blood was collected from sows several days before farrowing as well as from piglets at 1, 7 and 21 days and plasma was used for the measurement of antioxidant enzymes (CAT, SOD, GPx), nitric oxide production (NO), lipid peroxidation (TBARS) and total antioxidant capacity (TAC). A significant increase of antioxidant enzymes was observed in plasma of sows fed hemp diet at different time (SOD-1d, CAT-21d and GPx-21d) in comparison with sows fed control diet. Similarly, the TAC and NO increased, whereas the TBARS content decreased significantly throughout the lactation period in favour of the HD. In the case of piglets, the HD also increased the antioxidant enzymes activities and improved the lipid peroxidation and nitric oxide production up to day 21.

Keywords: *Hemp seeds, diet, PUFA, oxidative stress, antioxidant enzymes*

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0101.





Effect of inulin supplementation during the lactation period on the porcine gut microbiota and immune response at weaning and 7 weeks of age

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Inulin is widely known as a prebiotic modulating the composition of the microbiota with an interaction on the immune response, resulting in a beneficial effect on host intestinal health. In this study, we investigated whether the oral supplementation of inulin to piglets during the lactation period leads to lasting effects after weaning. A total of 72 new-born piglets were used in the present study. Piglets received different inulin solutions (0%, 20% and 30%) twice a day from the first day after birth until 28d. The total volume administered was 2.5ml per day during the 1st week, 5ml per day during the 2nd week, 7.5ml per day during the 3rd week and 10ml per day during the 4th week. From 28d onwards, piglets were weaned and received a post-weaning diet lacking inulin during the following 3 weeks. Eight piglets per treatment were euthanized for sampling of intestinal content and tissue on 28d and 49d. At weaning, the concentration of propionate (P=0.012) and iso-butyrate (P=0.027) in the cecum were significantly higher in the 20% inulin treatment than in the 0% and 30% inulin treatments. In the colon, 20% inulin treatment significantly increased the concentration of total

SCFA (P=0.031) and iso-butyrate (P=0.031) compared to the 0% and 30% inulin treatments. A higher concentration of propionate (P=0.013) in the 20% inulin treatment was observed compared to the 30% inulin treatment with 0% inulin treatment having intermediate values. Moreover, the relative abundance of *Escherichia* (P=0.047) and *Enterobacteria* (P=0.014) in colonic content were significantly lower in the 20% inulin treatment. Both inulin-treatments significantly decreased IL8, IL10, TNF- α , TLR4 expression in the colon (P<0.05). However, on 49d, most of these differences disappeared. In conclusion, the administration of inulin during the lactation period of piglets had a prebiotic effect, which was dose-dependent, but this beneficial effect did not seem to last after weaning.

Keywords: gut microbiota, immune response, inulin, lactation period, piglets, SCFA



Analysis of the effects of polyphenol - enriched grape pomace extract and Lactobacilli mixture in LPS-treated Caco-2 cells using array technologies

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The rapid increase of the incidence of intestinal inflammatory pathologies has a great impact on the quality of life. Inflammatory bowel disease (IBD) is a chronic pathology resulting from uncontrolled inflammation that ultimately leads to mucosal disruption and ulceration. Due to the limited efficacy of the current therapies, nutritional approaches could be an alternative strategy for IBD management, such as the use of *prebiotics* (natural bioactive compounds) and *probiotics* (Lactobacilli sp, other microorganisms). The aim of this study was to investigate the effect of polyphenols from grape pomace (GP) used as prebiotics and Lactobacilli sp. (probiotics) in restoring the mediators associated with intestinal inflammation in a LPS- treated Caco-2 cells as in vitro model. After induction of intestinal inflammation, cells were cultured in presence of a GP extract (50µg/ml), a mixture of three Lactobacilli sp (Lb, 3x10⁸ CFU/ml total Lb) or the combination of them for 24 hours. The gene expression of inflammatory mediators and related signalling molecules was evaluated by customised qPCR array. Our results showed that Lb mixture added to the LPS-pre-treated Caco-2 cells induced for example an up-regulation of 57% of the analysed chemokine mRNAs, while 50µg/ml of GP extract had no significant effect on these markers. GP extract and Lb mixture led to the over-expression of cytokine mRNAs. The symbiotic combination between prebiotics and probiotics added to the inflamed cells led to a down-regulation of chemokine, cytokine and of growth factors gene expression in comparison with LPS-treated cells. The GP and Lb treatments alone decreased the gene expression for JNK1, JNK2 and ERK2 in comparison with LPS-treated cells while their combination produced a down-regulation of genes coding for JNK2 and for ERK1 and of Nrf2 and AhR signalling gene expression.

Our study showed that GP derived polyphenols and probiotics could restore the gene expression for important markers associated with epithelial inflammation in Caco-2 intestinal cells. In conclusion, the polyphenols from GP alone or in combination with probiotics could be a useful nutritional strategy in IBD-associated intestinal inflammation management.

Aknowledgements

This work was supported by funds from the Romanian Ministry of Education and Research through TE program, 302.

Activity of intestinal alkaline phosphatase in gut tissue and faeces as a marker of gut health

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The aim of this research was to evaluate intestinal alkaline phosphatase (IAP) activity in gut tissue and faeces as a marker of gut health. Alkaline phosphatase is usually expressed on the surface of the brush border membrane of the enterocytes facing the small intestinal lumen. It plays a key role in suppressing proinflammatory response to commensal microbes by acting as a microflora-controlled LPS detoxifying mechanism at the epithelial surface. Research so far indicates that gut stress due to the disease or starvation decreases IAP activity in gut mucosa of piglets but increases IAP activity in faeces due to some chronic diseases in mouse and humans. Since determining IAP activity in faeces is noninvasive method, our goal was to establish whether we could use IAP activity in piglet faeces as a marker of gut health. A total of 16 male piglets average body weight of 13.11 ± 0.23 kg were randomly divided in two groups: control group (CG) and experimental group (EG). Control group piglet were fed with prestarter feed for piglets around weaning BABISTAR GOLD P (NuScience, Booiebos, Belgium), with 16.5% raw protein. To induce diarrhea in experimental group, protein content in control diet was increased to 25% with addition of soybean meal. After 7 days piglets were euthanized and blood, tissue and faeces samples were collected. We determined lower (P<0.05) villus height in duodenum and ileum of EG piglets compared to the CG piglets, which in conjunction with visible diarrhoea of EG piglets, confirms that piglets of EG were under gut stress. Both in duodenum and jejunum but not in ileum IAP activity in mucosa tissue was lower (P<0.05) in EG

compared to the CG which is in correlation with previous research. Faeces of EG piglets had lower (P<0.05) dry matter (DM) content compared to the CG. In the faeces we did not find any significant (P>0.05) difference in IAP activity between EG and CG piglets when IAP activity is expressed per gram of fresh faeces, and only a tendency (P=0.0537) toward it when IAP activity is expressed per gram of faeces DM. Glucose concentration in blood of EG was lower (P<0.05) compared to the CG probably because of smaller absorption capacity of carbohydrates due to the lower villus height. Higher (P<0.05) total protein concentration in blood of EG piglets is most probably a consequence of higher protein value in diet. Haptoglobine and IgG concentration in blood did not significantly differ between groups but IgM concentration was higher (P<0.05) in blood of EG compared to the CG piglets. In this way, we can conclude that IAP activity in gut tissue does change in gut stressful situations like diarrhea caused by excess of proteins in feed, but we can't use IAP activity in faeces as a marker of gut health. Blood parameters like glucose and IgM concentrations could be indirect indicators of gut health.

Assessing the morphological, cultural, biochemical profile and enzymatic activity of a *Lactobacillus acidophilus* strain isolated from turkey ileum intestinal content

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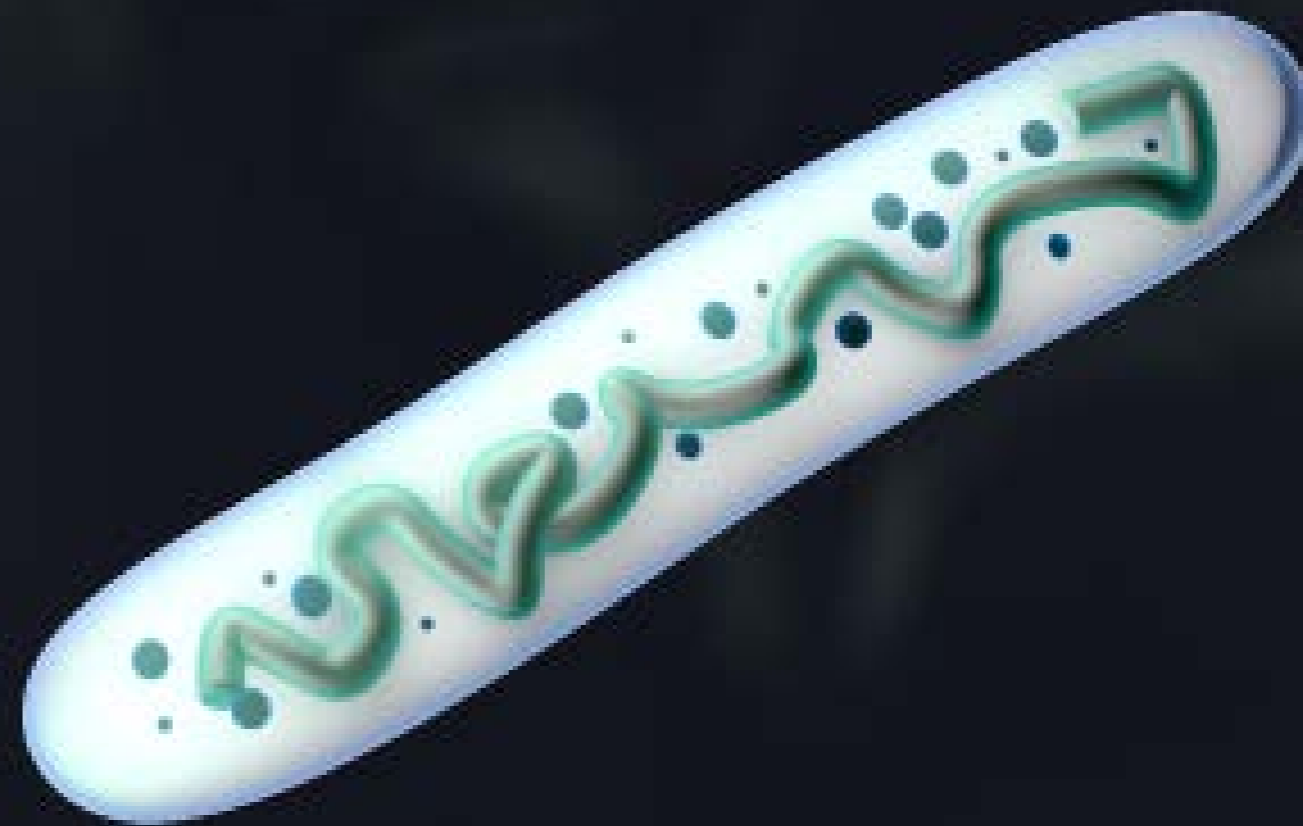
The aim of the study was to isolate, identify and preliminary characterise a lactic acid bacteria strain. The strain was assayed morphologically, culturally, biochemically and enzymatically (amylolytic and cellulolytic activity). The isolate was obtained from the ileum intestinal content of turkey (46-day-old) and was phenotypically identified to be *Lactobacillus acidophilus*. The new strain was conserved as strain *Lactobacillus acidophilus* IBNA 09 in the Collection of INCDBNA. It is Gram positive bacilli, thin, non-spore forming, appears isolated, rarely in the diploid form, in short chains or in small irregular piles in culture of 24-48 h in Oxoid MRS broth and MRS agar medium. The strain is an aerotolerant bacteria. The identification and analysis of the biochemical characteristics was performed by catalase assay, API 50 CHL Biomerieux strips, apiweb API 50 CHL V 5.1 soft („excellent identification”, *Lactobacillus acidophilus* 2, 99.9% ID) and ABIS online (*Lactobacillus acidophilus* ~ 88%). The enzymatic activity was determined by two methods: the Hostettler's method for amylase activity and the Petterson's and Porath's method for cellulolytic activity. The new strain, *Lactobacillus acidophilus*

IBNA 09, was incubated at 37°C in aerobic and anaerobic atmosphere. An optimal growth was recorded in the MRS broth medium in aerobic conditions for 48-72 h. The strain had an amylase activity of 0.466 (UDNS / ml) to 48 h, compared to 0.156 (UDNS / ml) to 72 h, incubation at 37°C. The microbial strain did not record a positive cellulolytic activity value (-0.06 UDNS / ml) at 48 h. On the contrary, the strain had 0.01 (UDNS / ml) cellulolytic activity at 72 h at 37°C. In conclusion, the results suggest that *Lactobacillus acidophilus* IBNA 09 strain had some probiotic characteristics and can be further assessed for other probiotic characters (resistance to pH 2.0, resistance to bile acids and salts, antibacterial activity, induction of local immune response etc.) in order to evaluate its probiotic utility in turkey nutrition.

Keywords: *Lactobacillus acidophilus*, API 50 CHL, exogenous enzymes, enzymatic activity

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0106 and from ADER project 611.



Specific intestinal toxicity of deoxynivalenol and cadmium: analysis on pig jejunal explant

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Deoxynivalenol (DON), is the most prevalent mycotoxin naturally present in grains and other commodities. It is produced by toxigenic fungus *Fusarium* species that are common pathogens of cereal crops under temperate climate. In pigs, chronic exposure to DON reduces feed consumption and weight gain, induces neuro-endocrine changes, and alters intestinal and immune functions. Cadmium (Cd) is one of common and widespread toxic heavy metals found naturally in the Earth's crust. Its presence in the environment is a consequence of both natural and anthropic processes. Cd can be released into soil, water and air. It is soluble in water and can be uptake by plant roots and accumulate into the edible parts especially cereal products. Chronic intoxication with Cd may result in various organs damage especially kidney. Through its high consumption of cereals, pigs can be exposed to both DON and Cd. Using pig intestinal explant this study was designed to analyse their intestinal toxicity when present alone or in combination. Jejunal explants were treated with increasing concentration of both contaminants for 4 hours and the expression of 17 genes targeting the immune response (IL-1 β , IL-1 α , IL-8, IL-10, IL-17a, IL-22, IFN γ , TGF- β , TNF- α), the oxidative stress (NF- κ B, MT1A, MT2A, CCS, SOD1, SOD2, CAT, DUOX) was analysed by RT-qPCR. Our data confirm the inflammatory effect of DON with induction of the expression of genes encoding for IL-1 β , IL-1 α , IL-8, IL-17a and TNF- α . Exposure of pig explant to Cd induced the gene expression of metallothioneins (MT1A, MT2A) but did not have any effect of the inflammatory genes. When DON and Cd were present together, an increased expression of both inflammatory genes and metallothioneins genes was observed. Taken together our data demonstrate a specific intestinal effect of DON and Cd and suggest that these contaminants do not interact at the intestinal level.





Avian egg yolk and cryopreservation of buffalo semen

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Egg yolk is used in semen extenders for its cryoprotectant role which has been attributed to its low density lipoprotein (LDL) fraction that contains proteins, lipids, phospholipids, cholesterol, and both saturated and unsaturated fatty acids. In addition, egg yolk contains vitamins, minerals/trace elements and antioxidants. Chicken egg yolk is routinely used as a cryoprotectant for bull semen preservation, however, other avian egg yolks have also been investigated. Buffalo bull sperm have comparatively higher poly unsaturated fatty acid and lower cholesterol content in their membranes which make them more prone to cryodamages compared to cattle bull sperm. As egg yolks from different avian species differ in terms of the cholesterol, fatty acid, phospholipid, amino acids and trace elements, we have done few studies and tested egg yolks from several avian species as cryoprotectants in the extender for buffalo semen. In our first study, duck egg yolk gave better post-thaw sperm quality when compared with egg yolks from guinea fowl, Indian indigenous or commercial chicken. In our 2nd study, quail and turkey egg yolks were compared with the routinely used chicken egg yolk. Quail egg yolk (at 5%) had better post-thaw buffalo sperm quality than the chicken egg yolk (at 20%). Similarly turkey egg yolk (at 10%) conserved better post-thaw sperm quality and reduced the enzyme leakage than 20% chicken egg yolk. Moreover, a higher in vivo fertility was observed in buffalo after AI using cryopreserved semen with quail or turkey egg yolk in the extender than the chicken egg yolk. Further studies on pigeon and guinea fowl egg yolk are in progress and we found interesting results in terms of post thaw quality, enzyme leakage and fertility of buffalo sperm. In conclusion, requirement of the egg yolk as a cryoprotectant in the semen extender was recorded to be a quarter (5% vs 20%) for quail, and half (10% vs 20%) for turkey and pigeon compared to routinely used chicken egg yolk. Moreover, the use of quail, turkey and pigeon egg yolk in the semen extender improved post-thaw sperm quality and post-AI fertility in the buffalo.





Multiple regression equations used to estimate sheep meat production by ultrasound and carcass measurements

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In the present study non-linear multiple regression equations and carcass ultrasound measurements were used to estimate the amount of meat in carcass and commercial cuts in local breed Teleorman Black Head (TBH). The measurements were conducted on 79 TBH lambs aged 2.5 months, in two points (P1 – located 5 cm from the spine, in line with the 12th rib; P2 – located between 3rd and 4th lumbar) of longissimus dorsi muscle to obtain the following parameters: subcutaneous fat layer thickness (2.21; 2.03 mm), muscle depth (20.81; 19.54 mm), muscle eye area (8.93; 8.71 cm²) and muscle perimeter (121.97; 121.57 mm). The non-linear multiple regression equations based on all four ultrasound parameters measured in P1 gave the most precise estimations for carcass meat and commercial cuts: leg and loin (0.994), shoulder (0.963) and rack (0.938). The best estimations of the carcass meat amount and half carcass meat amount using three ultrasound parameters (depth, eye area and perimeter of muscle) were obtained in P1, with a precision of 0.818 and 0.803, respectively. Non-linear multiple regression equations using only one ultrasound parameter (muscle

eye area) measured in P2 gave the most precise estimations for: carcass meat (0.916), half carcass meat (0.880) and commercial cuts such as loin (0.976), rack (0.950) and shoulder (0.911). The non-linear multiple regression equations developed by using ultrasounds parameters showed very high precision coefficients, which suggests that only ultrasound measurements and proposed equations might be used to estimate the meat production and to improve the evaluation of sheep selected for meat production.
Keywords: carcass, commercial cuts, lamb, local breed, non-linear multiple regression equations, ultrasound measurements

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 0938 0403.

Determination of rumen degradability, intestinal digestibility and protein value of Bulgarian sunflower cake

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The objective was to determine the rumen degradation kinetics, intestinal digestibility and protein nutritional value for ruminant animals of sunflower cake (SFC). Three non-lactating Jersey cows with a body weight of 436 ± 18 kg fitted with a rumen and T-type duodenal cannulas were used in the trial. Six samples of SFC were collected from six processing companies (SFC1 to SFC6). The samples were incubated in the rumen of the cows for 0, 2, 4, 8, 16, 24 and 48 h in 6 replications. The rapidly degradable fraction a of DM was significantly lowest to SFC2 (15.8%) and highest at SFC6 (25.8%) ($P < 0.05$). The effective degradability of DM of SFCs at outflow rate 0.06/h ranged greatly from 47% to 63%. The soluble fraction of CP ranged from 24.9% for SFC3 to 34.1% for SFC4 ($P < 0.05$). Effective degradability of CP for SFC6 is higher ($P < 0.05$), than the other five samples of SFC. The intestinal digestibility of the DM measured by mobile bag technique varied from 36.5% for SFC6 to 46.9% for SFC3. The values for intestinal digestibility of CP for SFC3 (94%) were significantly higher than the other samples ($P < 0.05$). The average value for protein digestible in the small intestine, according to the Bulgarian protein system, at a rumen outflow rate 0.06/h, was 154 g/kg DM, and the balance of protein in the rumen was 101 g/kg DM. Although nutrient composition of SFCs from different processing plants is variable, the protein degradability and digestibility values obtained in this experiment can be used in formulating rations for ruminant animals. The observed differences are mainly attributed to the different degree of removing the oil and variation of the quality of sunflower seeds.



Different methods for estimation of protein intestinal digestibility in ruminants

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Measuring intestinal digestion of protein *in vivo* is difficult, expensive and time-consuming. Therefore, alternative methods have been developed.

The objective of this study was to measure and compare intestinal digestibility using three methods: mobile bag, *in vitro* and *in vivo*. To obtain the ruminal undegradable protein (RUP) the samples were ruminally incubated in *sacco* for 16 h in four dry cows with ruminal cannula. Intestinal digestibility of undegraded crude protein was determined by *mobile bag* method – four cannulated dry cows with T-cannula in proximal duodenum, *in vitro* method – enzymatic two-steps method, and for *in vivo* method - rats of the Wistar breed were used. Cereals (wheat, barley, oats and rye), maize, rapeseed meal, soybean meal and sunflower meal were used for this purpose. The highest losses of N after 16 hours of incubation in the rumen were determined in wheat (93.5%), rye (90.2%) and barley (89.3%). The lowest losses were observed in maize (64.6%). Intestinal digestibility of undegraded residues determined by different methods increased while ruminal degradation decreased. More than 85% of soybean meal crude protein from the residual amount of undegraded N were digested in the rumen. The mobile bag method yielded the highest values of intestinal digestibility. The smallest differences between the compared methods (6.5%) were calculated for wheat. The largest differences (36.1%) were calculated for maize. From all samples, the soybean meal was the most digestible for all used methods (*in vivo* – 85.6%, *in vitro* – 85.8%, *mobile bag* 97.6 %).

Keywords: intestinal digestibility; methods; ruminants



Assessment of an alternative protein source for dairy cattle nutrition

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The substitution of soybean meal (SBM) in compound feeds (CFs) given to dairy cattle, with alternative sources, cheaper but with close nutritional qualities, continues to be a dominant concern in ruminant's nutrition research field. The aim of this assay was to study the total replacement of SBM with a rapeseed by-product (RS-by) on milk yield, primary chemical composition (protein, fat, solids non-fat) and fatty acids content. Eight multiparous dairy cattle, Montbeliarde breed, mid-lactation stage, with an initial average milk yield of 16.36 l/d (SD=1.53), were randomly assigned to 2 homogeneous groups of 4 cows each, for 42 days. Both groups received the same basal diet: maize silage and alfalfa hay. Treatments evaluated were two types of CFs: control (with 12.5% SBM) and experimental (with 12.5% RS-by). The milk yield in the experimental group was significantly lower (with 26%; $P < 0.05$) compared to control, whereas the milk protein, fat and solids non-fat content did not differ ($P > 0.05$) among groups. The experimental diet influenced the milk fatty acids content. The total saturated fatty acids were significantly

lower whereas the total unsaturated, monounsaturated and polyunsaturated fatty acids were significantly higher when compared to control diet. The RS-by can be an alternative to soybean meal especially in the context when producers, processors and consumers alike care for raw milk with improved qualities.
 Keywords: dairy cattle, soybean meal, rapeseed by-product, milk yield, milk fatty acids



The new approach in the production and the use of sunflower meal

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Sunflower meal (SFM) is a basic and cheapest source of feed protein in Bulgaria. Its use is limited by the high content of hulls, which decrease its energy and protein value, and by low content of amino acids lysine and threonine. In ruminants an additional problem is high degradability of protein. Recently a new technology for separation of SFM in low and high cellulose fractions was developed and applied. The low cellulose fraction contains 46 or 50 % crude protein (trade names Sunpro-46 and Sunpro-50). It is suitable for feeding poultry, growing pigs and lactating sows. To increase utilization of diet it is necessary to be supplemented with fat, synthetic amino acids (lysine, threonine), enzymes (phytase, β -glucanase, xylanase, protease) and eventually to be pelleted. The high cellulose fraction (Sunpro-17) contains too much impregnate by lignin and silica hulls, which limit including in rations. After additional removing a part of hulls and supplementation with molasses, minerals and vitamins it may become acceptable concentrate feed (Sunpro-25) for low productive ruminants (dry cows, first stage of fattening animals, replacing heifers, lambs, and kids). It is necessary to prove possibilities to use this fraction in rations of rabbits, pregnant sows and finishing period of fattening pigs. The SFM for high productive ruminants is advisable to be toasted for decreasing degradability and increasing utilization of protein. The studies are needed for better estimation feeding characteristics of different new SFM products, for optimizing combinations with other protein sources, and for establishing the best composition of feed mixtures for different species and categories of animal. The trials are needed for estimation degree of replacement soybean meal by new SFM products and its economic impact on animal production.





Prospects of some new and non-traditional fodder crops for silage in Republic of Moldova

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Livestock constituted one of the main economic activities and plays an important role in the agricultural economy and nutritional security of the Republic of Moldova. The economic viability of livestock husbandry is dependent on the genetic potential for production, good health care, balanced feeding of animals and efficient marketing of the produce. It is known that in cattle diets the specific weight is succulent feed. The silage is an important agricultural technique for maintaining and increasing the productivity of herds, especially during the off-season, when there is scarcity of food for ruminants. The adverse climatic conditions, water deficiency in soil, associated to high temperatures and strong

evapotranspiration had serious consequences on the forage production in our region. Corn silage is one of the most common, but frequent droughts, rising prices of seeds, agricultural equipment, fuel and fertilizers have a negative impact on the productivity and the cost of corn. Considering the limitations of traditionally cultivated fodder crops, it is necessary to introduce various non-traditional fodder crops for growing on marginally, restored degraded and denuded lands.

Over more than half a century, as a result of the mobilization, introduction and acclimatization researches done in the Botanical Garden (Institute) of the ASM (GBI), collections and exhibitions of plants with multiple uses, necessary for the development of the national economy, were founded. Selection of suitable fodder crops to suit the local agro-climatic conditions, availability of good quality certified seeds, knowledge about cultivation, storage and use practices, are important research direction. Perennial species demonstrated to have a high yield potential, require less herbicides, fertilisers and tillage operations than annual crops, providing the soil with an all-year-long protection from water erosion thus limiting the soil fertility degradation.

The local varieties: *Gigant* of Sakhalin knotweed, *Polygonum sachalinense* and *Solar* of topinambour *Helianthus tuberosus* created in the GBI ASM, registered in the Catalogue of plant varieties and patented of the AGEPI in Republic of Moldova and local ecotype elecampane *Inula helenium* served as object of study. Plant species grown on experimental land GBI ASM.

The silage was prepared and evaluated in accordance with the Moldavian standard SM 108. The nutritive values were evaluated in terms of the chemical composition, content of crude protein (CP), crude ash, acid detergent fiber (ADF), neutral detergent fiber (NDF) and acid detergent lignin (ADL), digestible dry matter (DDM), digestible organic matter (DOM), relative feed value (RFV).

The green mass of the investigated plants is distinguished by a different leaf and dry matter content and no juice leakage was observed during fermentation. During the organoleptic assessment of the silage it was found that plant structure is well preserved, silage from cv. *Gigant* has olive grey colour and pleasant smell like pickled apples; cv *Solar* silage - stems were yellow-green, and the leaves –

dark green with shades of brown, but the silage *Inula helenium* – green-olive leaves and yellow-green stems, characterized by a pleasant smell of pickled apples. The pH index was 4.17-4.70, butyric acid not identified, the lactic acid represents 78-80% of the organic acids; the dry matter content varies from 18% in *Inula helenium* silage up to 30% *Helianthus tuberosus* silage. CP, ADF, NDF, ADL and Ash contents ranged from 9.7 to 16.0%, from 27.0 to 39.0%, from 44.5 to 54.9%, from 4.3 to 9.8% and from 10.3 to 14.8%, respectively. The DDM and DOM varied from 52.1 to 72.3% and from 42.7 to 65.9%, respectively. The relative feed value ranged from 100 to 142.

The obtained results indicate the possibility of using the non-traditional fodder crops for the preparation of valuable forage for cattle.

Keywords: biochemical composition, nutritive value, organoleptic assessment, *Polygonum sachalinense*, *Helianthus tuberosus*, *Inula helenium*, silage



An Ayurvedic approach to the treatment of RFM / ROP

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In memoriam – A.I. Birtoiu¹⁾

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Retention of the foetal membranes (RFM/ ROP) in cattle is defined as the situation in which the foetal membranes are not expelled within a period of 12 hours after expulsion of the foetus. This is a common postpartum complication in ruminants (particularly in cattle) which is due to failure of the foetal villi to detach themselves from the maternal crypts. RFM determines important economic losses in the herd, due adverse health effects of affected animals (delayed involution of the uterus and also providing a favourable environment for bacterial colonization) which are reflected in the decrease of reproductive performance. Plants have been used as medicine in the treatment of animals from thousands of years since ancient time. The aim of this clinical study was to evaluate the efficacy of a polyherbal formula named HimROP Vet (Himalaya) in the cows with RFM. In this trial were included 20 cows which had a complicated puerperium (RFM with a uterine slow regression). These cows were divided in 2 equal groups: experimental group (E) and control group (M). The experimental group was treated with HimROP Vet, while the control group received the specific treatment which is usually used in the

ROP in cows (Prosolvin 2 mls – 15mg, I.M. injection, single administration, followed by the intrauterine administration of a mixture made from 5 grams of Oxytetracycline, 30 mls of ethylic alcohol 70° and 500 mls of saline solution). It was measured the period between the administration of HimROP Vet product and the aspect of the genital discharge until normalization. In the group E, 70% of cows had their placenta expelled in less than 24 hours and another 10% in 24-48 hours. Only two cows from E group needed the administration of normal medication used for RFM and had eliminated the fetal membranes at 7 days post-partum. In the M group, all the cows eliminated the placenta in between 6 – 10 days post-partum. Comparing the results of the trial for the two groups of cattle, we can conclude that HimROP Vet product (Himalaya) has a strong tonic effect over the uterus, helping, in a high percentage, with the expulsion of the foetal membranes.

Keywords: HimROP Vet, Himalaya, Retention of placenta, cows, polyherbal formula, Ayurvedic principles

Rumen degradability of dry matter and protein in four basic protein sources participating in the rations of ruminants

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This study evaluated the in situ ruminal degradability of sunflower meal (SFM), soybean meal (SBM), rapeseed meal, canola type (RSM) and dry distillers grain with solubles from maize (DDGS). In situ dry matter (DM) and crude protein (CP) degradability was estimated following Orskov and McDonald (1979) method using one rumen-fistulated cow at 0, 2, 4, 8, 16, 24 and 48 h rumen incubation time for totally 6 samples of each feed and incubation interval. Ruminal disappearance of DM of SFM and DDGS was much slower, and after 8 h of rumen incubation differences were significant ($P < 0.05$) compared to DM disappearance of SBM and RSM. Disappearance of DM of SBM and RSM was very similar and didn't differ significantly at any time of rumen incubation. Disappearance of CP of DDGS was slower and after 8 h of incubation differences were significant ($P < 0.05$) compared to other three protein feeds. SFM had faster ($P < 0.05$) protein degradability during the first 8 hours of rumen incubation compared to the other three feeds. On the opposite, SBM and RSM protein degradability was slower than that of SFM for the first 8 h of rumen incubation, but later SBM degradability was slightly better than that for SFM and RSM. There was no correlation between DM and CP values of the rapidly disappearing fraction in different feeds. The rapidly degradable DM fraction a had higher value than protein fraction a in all tested feeds. SFM and DDGS had significantly ($P < 0.05$) higher easily degradable CP fraction a, compared to SBM and RSM. Rate of degradation of DM and CP of DDGS was much lower ($P < 0.05$) than in other feeds. Effective degradability values independently of passage rate of rumen content of DM in SFM and DDGS were significantly lower, than for SBM and RSM. Effective degradability of CP ($k = 0.045$) was significantly lower ($P < 0.05$) for DDGS than for the other three feeds, a for $k = 0.006$ and $k = 0.008$ much lower for SFM. Effective degradability of SFM was the highest at $k = 0.045$, followed by SBM and RSM ($P < 0.05$).

Key words: rumen degradability, dry matter, crude protein.

Abbreviations: DDGS – dry distillers grain with solubles from maize, DM – dry matter, SBM – soybean meal, SFM – sunflower meal, RSM – rapeseed meal canola type



Study on the determination of the chemical composition, nutritional value and efficiency of the use of dried grape marc in the composition of the mixed fodder intended for young taurine

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The chemical composition and nutritive value of dried grape marc was studied. The dry substance of this product contains crude protein - 11.44%, crude fat - 7.55%, crude cellulose 31.2%, SEN 40.92%, Ca - 6.25g / kg, P - 1.93g / kg. It has been demonstrated the efficiency of the use of this production the amount of 15% of the component of mixed fodder intended for young cattle gaining a daily gain of 1182g. The dried grape seed and partially separated from the seeds is composed at the level of 89-91% of the bead peel, 1.3-1.7% fragments of bunches and differs from traditional marc by the fact that it contains a low level of seeds - 6.0-8.8%, whereas in ordinary marc this index is more than 30%.

Keywords: mixed fodder, dry grape marc, young taurine.



Effectiveness of usage of cake obtained from grape seeds in the food of pigs for fattening

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The paper presents the results of the study on the productive and economic impact in consequence of the use in food of young porcine for fattening of industrial residues obtained from the processing of grapes.

As a result of the researches, new data have been obtained on the indexes of the production and quality of carcasses at swine, using in the recipe the obtained cake from grape seeds in different proportions.

The use of grape seed cake in mixed fodder for pigs for fattening in the amount of 4% of compound feed gave the opportunity to achieve a daily average increase of 716 g, well-developed hams with an average weight of 10.96 kg, muscle eye area of 41.8 cm² with a protein content of 19.87%, fat of 1.82%, and a net profit to each sold piglet of 154,04lei.

We believe that this ingredient adds biological value to the obtained products because it acts as a very powerful natural antioxidant, and its use in food represents a nutritional perspective for swine growth.

Keywords: chemical composition, specific consumption, mixed fodder, swine, grape seed cake.



Genetic structure of Rhode-Island Red chicken breed population on PRL and INS loci. Associations between genotype and chicken productivity

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The aim of recent study was to analyse the genetic structure of local line of Rhode Island Red chicken breed on prolactin and insulin genes and estimate associations between productivity traits of studied chickens and genotypes. Four specific markers studied in this work were 24 indel and C-2402T, located in prolactin gene, and T+3737C and A+3971G located in insulin locus. All markers, except 24 indel, were studied using Polymerase Chain Reaction – Restriction Fragment Length Polymorphism. 24 indel of prolactin gene was studied by amplification fragment length polymorphism. Investigated population was polymorphic on all chosen markers and in the Hardy-Weinberg equilibrium. Alleles frequencies on different polymorphisms were for prolactin 24 indel: I – 0.06, D – 0.94; for prolactin C-2402T: C – 0.14, T – 0.86; for insulin T+3737C: C – 0.635, T – 0.365; for insulin A+3971G: A – 0.245, G – 0.755. It was revealed that the egg number in 40 weeks for the chickens with I/D and C/T genotypes of the prolactin 24 indel and C-2402T, respectively, exceeded that for those with D/D and T/T and amounted to 227.6±7.12 and 212.1±2.57 for 24 indel, 221.7±4.37 and 210.6±3.03 for C-2402T, respectively (p<0.05). Egg weight on the 52nd week of life was significantly (p<0.05) higher for individuals with D/D of prolactin 24

indel (62.4±0.61) and T/T of prolactin C-2402T (62.8±0.64) than for chickens with I/D (59.2±1.21 g) and C/T (59.8±1.08 g) genotypes of the same markers. The marker A+3971G of insulin gene are associated with breast muscle weight of chicken: heterozygotes A/G had higher (98.8±2.72 g) weight than G/G (91.7±2.26 g) on reliable level (p<0.05). Received data can be used in breeding and selection programs for improving productivity traits of studied line of chickens. Keywords: Rhode Island Red chicken breed, prolactin gene, insulin gene, polymerase chain reaction – restriction fragment length polymorphism, meat and egg productivity traits, marker-assisted selection.

Trace elements in chelates form use in cows feeding in conditions of copper, zinc and manganese lack in vegetable feeds of Forest-Steppe zone of Ukraine

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This article highlights the net research results on trace element composition of feed during 2012-2015, the effect of trace elements in chelates form feeding that are scarce in feed, on the concentration of copper (Cu), zinc (Zn) and manganese (Mn) in the blood and milk of the cows of the Ukrainian black-and-white milk breed. The general tendency to decrease the content of Cu, Zn, Mn in corn silage, alfalfa haylage, alfalfa hay, used in feeding cows of the Forest-steppe zone of Ukraine was revealed. The deficit of micronutrients in the diet of the cow ration was established at the level of 31, 175 and 39 mg/cow/day, and in the period of lactation, on average 32, 462 and 323 mg/cow/day, respectively, for Cu, Zn and Mn. In the control group of cows, the deficit of trace elements in the diet was offset by feeding the premix with sulfuric acid salts of Cu, Zn and Mn in a dose that offset their lack in feed for 100 %. Experimental animals of groups I, II and III fed premixes with complexes of chelates of these trace elements (in terms of pure element), which compensated their deficiency in feed of the diet by 100, 50 and 25 %, respectively. As a result of experimental studies was found that the concentration of Cu, Zn and Mn in the blood of all cows was within the limits of the physiological norm and in the dry period was somewhat higher than in lactation period. Relatively lower content of Cu, Zn and Mn in the blood of cows of the III experimental group in the dry period, compared with I, was determined by 14.5 %, 25.7 %, 13.2 % ($p < 0.05$),

respectively. During the lactation, a significant difference was found ($p < 0.05$) relative to the third group in the concentration of trace elements in the blood of cows. Our experiments showed that the trace elements content in the milk of all cows didn't exceed the maximum permissible standards. A significantly higher concentration of Zn in the milk of cows of groups I and II was established relative to III by 22.0 % and 20.1 % ($p < 0.05$), respectively. In relation to the control group, the use of trace elements chelates in feeding cows doesn't significantly affect the concentration of trace elements in the blood and milk of cows. To prevent microelement deficiency symptoms occurrence in cows, it's necessary to continuously monitor their content in the diet of the diet, and correct it by chelating complexes of trace elements, using a dose twice the rate of feeding of sulfuric acid salts.

Keywords: chelates, cows, milk, trace elements, blood





Effects of rosemary distillation residues insertion in feed blocks on growth and digestive parameters for Barbarine ewe-lambs

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The production of rosemary essential oils results in considerable amounts of rosemary residues (RR). The purpose of this study was to assess the partial substitution of concentrate by feed blocks based on rosemary distillation residues (RR). The effects on growth, digestibility, nitrogen retention and ruminal fermentation of Barbarine ewe-lambs were evaluated. Sixteen fat tail ewe-lambs (26.1±1.2 kg) were divided into two homogeneous groups according to their body weight (BW). The basal diet was 600g of oat hay for all animals; the feed supply was 500g of concentrate for the control (C) group and 250g of concentrate plus rosemary feed blocks ad libitum for the group receiving rosemary blocks (RB). Hay intake was similar ($P>0.05$) for all lambs (522g of dry matter (DM)/ day), the concentrate intake was 427 and 214 g DM for C and RB, respectively, and the feed blocks intake was 84 g DM/day for RB group. Final BW and average daily gain (ADG) were greater for C ($p<0.05$). Digestibility of DM, OM, NDF and ADF were greater in C regimen, while crude protein (CP) digestibility and nitrogen retention were similar among treatments. Ruminal pH was higher for RB group, however, ammonia (NH₃-N) and total volatile fatty acids (TVFA) concentration were not affected by treatment ($P<0.05$). It was concluded that the partial substitution of concentrate by feed blocks based on rosemary residues resulted in lower DM intake and growth rate, similar nitrogen retention and comparable fermentation parameters as the conventional regimen based on hay and concentrate.

Keywords: digestibility, ewe-lamb, growth, nitrogen, rosemary residues, volatile fatty acids.



Kompetitive allele specific genotyping of 48 single nucleotide polymorphisms in Saanen and French Alpine goat breeds and their association with milk production traits

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The aim of the current research was to investigate the effects of 48 single nucleotide polymorphisms (SNPs) on milk yield and major milk components in Saanen and French Alpine goats in order to find and describe polymorphisms that could prove useful for designing future genetic improvement schemes. Throughout the use of Kompetitive Allele Specific PCR (KASP™) method a number of 25 Saanen and 24 French Alpine unrelated multiparous goats (3rd lactations) reared under intensive commercial conditions (RO: 47°34'15"N 23°25'41"E) were included into this study and genotyped. A total of 13 SNPs (27.08%) from the selected 48 SNPs were polymorphic across the two populations and further used for the association study with milk production and composition. The polymorphic SNPs were detected in the following genes: CAST, CLEC4E, DES, GHRHR, HSP90AA1, IL15RA, IL1RN, IL8, MITF, PPRC1, SOCS3, TNF and TNFSF13. The French Alpine studied population was in Hardy-Weinberg disequilibrium at the g.62894878A>G locus (rs671391101) ($P < 0.05$). Results showed that four SNPs, rs671391101 (GHRHR), rs640582069 (IL1RN) rs635583012 (SOCS3) and rs635969404

(IL15RA) out of the 13 polymorphic markers, were significantly associated with milk production, protein, fat and lactose content in French Alpine breed ($P < 0.05$). However, no significant ($P > 0.05$) effect was recorded in the Saanen population regarding milk yield or milk chemical composition. Current results provide new insights for the development of SNP marker assisted selection technology in the goat industry and confirms the potential of using SNPs for GHRHR, IL1RN, SOCS3, IL15RA genes as candidate genes for selection, highlighting the direct implications of such genes in the farm production outputs. Results from this study are relevant for future goat genomic studies and the inclusion of such traits into up-to-date selection schemes.

Keywords: dairy goats, French Alpine, KASP, polymorphism, Saanen



Study on milk composition and milk protein polymorphism in Holstein cattle

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The aim of this study was to determine milk quality indices as well as milk protein polymorphism in Holstein cattle, using 22 milk samples. The types of different milk proteins were identified by SDS-PAGE. The test day milk yield and chemical composition assays were performed during the milking period of studied cattle. The quality indices are breed-specific for protein (3.38%) and higher for fat (4.39%). The electrophoretic pattern of milk samples showed the presence of four major caseins variants (α s1-, α s2, β and κ -casein) and two whey proteins (β -lactoglobulin, α -lactalbumin). The analysis of the milk proteins from Holstein cattle, separated by SDS-PAGE electrophoresis showed that the caseins account for 77.28% of the total milk proteins, while the major proteins from the whey represent 22.72% of the total protein. α s1-casein + α s2-casein had a higher expression (36.01%) followed by β -casein (31.45%), β -lactoglobulin (18.16%), κ -casein (9.82%) and α -lactalbumin (4.56%). The majority of milk samples is characterised by a medium expression level of both caseins and whey proteins (45.45-77.27%) followed by a higher level of expression.
 Keywords: cattle, milk protein polymorphism, milk quality indices

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0602.

Incorporation of distilled rosemary leaves and linseed in Barbarine cull ewes' diet: effect on weight gain, body condition and carcass characteristics

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In order to reduce the production cost of meat, a less expensive type of meat, such as cull ewe's meat and a low cost alternative feed resource such as agro-industrial by-products can be used. The objective of this work is to study the effect of adding distilled rosemary leaves and extruded linseed in the diet of Barbarine ewes on feed intake, body condition and carcass characteristics. The experience was carried out on 28 cull Barbarine fat-tail ewes, about 6 years old and 33 ± 0.5 kg body weight, divided into four homogeneous groups. Animals were housed in individual boxes and had two meals /day and free access to water. The control group (CC) was fed 500 g of barley-straw with concentrate, while the Rosemary group (RCC) received 300 g of straw and 200 g of distilled rosemary leaves with concentrate. The two other groups received the experimental concentrate, containing 10% of extruded linseed, with 500 g of straw for CLC group and, 300 g of straw and 200g of distilled rosemary leaves for RLC one. After 90 days, all animals were slaughtered. Daily intake of straw and concentrate decreased with the incorporation of distilled rosemary leaves or/and extruded linseed in ewes diet. However, the intake of distilled rosemary leaves was not affected by the composition of concentrate feed. Final body weight was 42.2,

42.3, 43.4 and 44.7 kg respectively for RLC, RCC, CLC and CC group. For all diets, the mean body weight gain was 10 kg, with an average daily gain of 132 g/day. The carcass weight and carcass yield were not affected by diet composition, they were 19.5kg and 54% respectively. The weight of all organs was not affected by the dietary treatments. The carcass composition was similar for all groups, with 55 % of muscle and 23 % of fat. Thus, the use of distilled rosemary leaves only or combined to extruded linseed in diet did not affect feed intake, body condition and carcass characteristics of cull Barbarine ewes. To conclude on the effect of studied diet on meat quality and fatty acid composition more measurement should continue.

Keywords. Cull ewes, intake, body condition, carcass

The effects of the *saccharomyces cerevisiae* used in the dairy cows food

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It is well known that *Saccharomyces cerevisiae* is an important source of energy and proteins in animal feeding. The purpose of this paper was to study the effects of the fresh yeast used in the dairy cows food, on productive and reproductive performances as well as on animals health. The efficiency testing of the fresh yeast was carried out in the Dairy Cows Farm of I.C.D.C.B. Balotesti, on a number of 40 Romanian Black Spotted heads: n=20 cows as experimental group (E) and n=20 cows as control group (M). During a long period (2013-2016) we introduced 50 g fresh yeast/head/day (group E), as a source of protein, amino acids, minerals and vitamins, for the energetic-protein balance of the ration. Results were expressed as a mean (\pm standard deviation). The Student's test was applied to obtain the significance of difference. The recorded values showed a higher average daily milk production with 2.53 ± 0.16 l/head/day ($P < 0.05$) for the experimental group (E) comparative with the control group (M) and a short calving interval, at the end of the experiment. The haematological profile parameters (red blood cells, haemoglobin, haematocrit, total white blood cells, lymphocytes,

monocytes, neutrophil) were in the normal physiological limits with no influence of the fresh yeast addition ($P > 0.05$) during the three years of the experiment. The means values recorded for asparagine aminotransferase (GOT) and alkaline phosphatase (PAL) were above normal physiological limit for the both experimental groups. In terms of protein profile parameters (total proteins, urea), significantly differences ($P < 0.05$) at the end of the experiment have been observed. Our results confirm that fresh yeast is a valuable ingredient in the dairy cows food with positive effects on their general welfare.

Keywords: yeast, dairy cows, productive performances, metabolic profile.

Influence of sorghum grain inclusion in dairy cattle diets on milk yield and composition

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The use of sorghum grain in the diets of dairy cattle may be an interesting alternative to the major energy source used in ruminant nutrition (e.g. corn grain). The aim of this study was to investigate the total replacement of corn grain with sorghum grain on milk yield and composition. Twelve multiparous dairy cattle, Montbeliarde breed, (19.24 ± 0.56 l/d), were divided into two groups. The cows received the same basal diet: spring hay (60 % oat hay + 40% vetch hay) and alfalfa haylage and two types of concentrate mix: control (no sorghum grain, C diet) and experimental (30% sorghum grain, SG diet) for 43 days. The ratio between bulk forages and concentrates mix was 60/40. An ultrasonic milk analyser, EkoMilk Bond Total, was used to determine the milk composition (protein, fat, lactose and solids non-fat content). The chemical composition of feed ingredients showed that sorghum grain compared to corn grain had higher organic matter, ether extractive, and nitrogen-free extractives concentrations while the energy value of both sources was comparable. The feed intake was not affected by the diet. The presence of sorghum grain in the diet slightly increased the milk yield (+ 9%; $P > 0.05$), whereas the milk protein (3.23 vs. 3.25; $P > 0.05$), fat (4.34 vs. 4.35; $P > 0.05$), lactose (4.65 vs. 4.68; $P > 0.05$) and solids non-fat content (8.53 vs. 8.57; $P > 0.05$) did not differ compared to the corn diet. The inclusion of 30% sorghum grain in dairy cattle diets can be a wise choice for farmers due to its chemical composition similar with corn grain, and to the lack of any adverse effects on milk yield and its nutritional components.

Keywords: dairy cattle, sorghum grain, corn grain, yield, milk composition

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0104.



Effect of different levels of marigold and paprika on egg production and yolk colour

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Yolk colour is a very important sensory characteristic of table eggs. It is considered as the most important egg characteristic when it comes to selection and assessment by consumers. In the last two decades, public opinion more clearly expresses aversion to synthetic additives to improve colour of egg yolks, and some countries introduced statutory prohibition on the use of artificial pigments in the diet of laying hens. Eggs enriched with natural pigments are desirable in human food chain due to numerous health benefits. In this study, we investigated the effect of inclusion of natural sources of pigments into laying hens' diet on egg production and yolk colour. Different levels of marigold and red sweet pepper were used as natural sources of pigments. The experiment which included 150 Lohmann Brown layers (38th week of production) lasted 4 weeks. Laying hens were divided into five groups (1 control and 4 experiments) with six replicates of

five birds each, which makes total of thirty hens per group. Hens were housed in individual wire cages with feed and water available ad libitum. Egg yolk colour was measured by Minolta, spectrophotometer and Roche yolk colour fan. The changes in egg, yolk, eggshell and albumen weights were not observed. On the other hand, significant differences between groups for L^* , a^* , b^* , β -carotene and Roche yolk colour were found. The largest differences were found between control and the group with 1.5% red sweet pepper for a^* from -0.79 to 17.66, respectively and for RYCF from 7.67 to 14.71, respectively.
 Keywords: egg, yolk colour, marigold, paprika, β -carotene

The effects of Enterocin M and Durancin ED26E/7 substances applied in drinking water on the selected carcass characteristics and meat quality of broiler rabbits

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Bacteriocins represent substances of proteinaceous character with antimicrobial spectrum. This in vivo study was designed to reveal whether antimicrobial effect of Enterocin M (produced by non-rabbit origin strain *Enterococcus faecium* AL41-CCM8558), in combination with Durancin ED26E/7 substances (produced by non-rabbit origin strain *Enterococcus durans* ED26E/7) is able to influence the meat quality of rabbits. A total of 80 post-weaned rabbits, meat line P91 and M91 (aged 35 days, both sexes), were randomly divided into 4 groups (20 animals in each group). Control group without enterocin administration and experimental groups: EG 2 received 50 μ l of Enterocin M, EG 3 with 50 μ l Durancin and EG 4 with combination both of substances (50 μ l of Enterocin M + 50 μ l of Durancin / animal/day) water administration for 21 days. Four animals (at the age 21 and 42 days) from each group were slaughtered. No clinically noticeable changes in the average body weight of experimental animals were observed. A positive influence of Enterocin M and Durancin was noted on animal health. Enterocin M and Durancin substances did not negatively influenced growth performance and meat quality of selected carcass characteristics and meat quality of broiler rabbits, in general.
 Keywords: Bacteriocin, Rabbit, Meat quality, Amino acids, Fatty acid



Chemical composition and fatty acid profile of Carpathian goat milk as related to the stage of lactation

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The aim of this study was to evaluate the variation of milk production, biochemical composition and milk fatty acid profile according to the lactation stage, on 60 pluriparous goats of the Carpathian breed, grown in an extensive system (Dobrogea, southern Romania). The goats were milked twice a day for 8 months, (February to September). Milk yield was recorded monthly and milk samples representative of the two daily milking were analysed for: protein, fat and lactose contents. In addition, fatty acid methyl esters were quantified using a gas chromatograph.

The maximum amount of milking milk was recorded at the end of April (1635.23 ± 0.048 g milk/ animal / day) and the smallest milk production was recorded in September (823.14 ± 0.191 g milk / goat / day). The biochemical composition of milk has varied considerably during lactation: in the first and last part of the lactation there was an insignificant increased concentration of its components (fat, protein, lactose, minerals). Monounsaturated and polyunsaturated acids levels increased during the summer months compared to spring months and the saturated fatty acid level decreased during the summer months. The percentage

of polyunsaturated fatty acids recorded the highest value in August (6.16 mean gFAME / 100g Total FAME), and the lowest value was at the beginning of lactation (4.51 mean gFAME / 100g Total FAME). The data recorded in our study show an increase in CLA (conjugated linolenic acid) concentration by April (0.85 mean gFAME / 100g Total FAME), when it reaches a maximum, it remains at an increased value until July, followed by an insignificant decrease (0.54 a mean gFAME / 100g Total FAME) towards the end of the lactation. A ratio of $\omega 6 / \omega 3$ fatty acids decreased in April under 4, the decrease of this ratio being significant compared to the first 2 months of lactation ($p < 0,05$).





Mitochondrial DNA polymorphism in Nigeria indigenous turkey population

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MtDNA still represents a useful tool in the study of molecular genetic diversity, because it appears in multiple copies in the cells and the mitochondrial gene content is strongly conserved across generations. In order to understand the population diversity of Nigerian indigenous turkey breed and to preserve this genetic diversity, evaluation of mitochondrial DNA sequence was employed. The study was aimed at determining mitochondrial DNA (mtDNA) D-loop, HV1 region polymorphism of indigenous turkey population in Nasarawa State north central Nigeria. We analyzed the complete mitochondrial DNA D-loop. To achieve this, blood samples were collected from 30 indigenous turkey, 10 each from three different populations separated by distance. A 623-bp fragment of the mtDNA D-loop region was sequenced in the sampled turkey populations. The results obtained indicate that in total, 11 haplotypes were identified, Haplotype diversity and nucleotide diversity were 0.81 ± 0.07 and 0.15 ± 0.07 respectively. With 126 number of polymorphic sites. Analysis of Molecular Variance (AMOVA) based on partial D-loop sequences of the turkey population also indicates that 99.05% of the total sequence variation between haplotypes was present within the population and 95.00% between populations. These results show a high mitochondrial D-loop diversity and indicate multiple maternal origins for Nigeria indigenous turkey. The molecular information on genetic diversity revealed in this study may be useful in developing genetic improvement and conservation strategies to better utilize indigenous Nigerian turkey resources

Keywords: Genetic diversity, turkey, indigenous, mitochondrial, population.





Grape pomace in piglets' feed – an absorption study

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Grape pomace (GP) is a waste of wine industry and consists mainly of skin residues, broken cells with pulp remains, stalks, and seeds. GP contains a great amount of anthocyanins, catechins, flavonols, alcohols and stilbenes and it is the best known and most widely studied for its antioxidant effect, which has been the focus of a large amount of analysis, mostly of clinical and nutritional nature. In recent years the interest in natural biologically active polyphenols from GP has grown also in the field of animal nutrition by their inclusion in the diet. This helps also to mitigate problems that arise from decomposition of such wastes in the environment, and this would be a strong point of using the winery industry byproducts in animal feed.

In this study piglets were fed with a diet containing 5% GP and the absorption of polyphenols in duodenum and colon was assessed. For this purpose 20 crossbred TOPIG starter piglets were assigned, for 36 days, to one of the 2 treatments: control (10 piglets- usual diet for weaned pig-C) and diet with 5% GP (10 piglets- diet -D). Duodenum and colon were collected at the end of this period from all piglets after slaughtering. From the frozen organ

samples a methanolic extract was obtained which was further analyzed by LC-MS. The results of these analyses show that in duodenum of D group the procyanidin trimer C2 was absorbed with the highest levels compared with C group. Besides procyanidin trimer C2, in colon, were identified also catechin, procyanidin trimer C1, with higher amounts registered in C group than in D samples.

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0203.

Effect of a high content of polyunsaturated fatty acids concentrate mix fed to dairy cattle on gestation-lactation phase - preliminary data

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The management of gestation-lactation phase represents one of the most difficult challenges for dairy farmers. The good evolution of parturition, complete elimination of placenta and especially the onset and lactation level, depend largely on how heifers and cows are maintained and fed during this transition period. In the event of metabolic and nutritional imbalances, animal health, generally, and reproductive apparatus, particularly, are impaired and can cause a decline in reproductive, productive and economic indices. Moreover, immediately after calving, cows are affected by the negative energy balance (NEB). Therefore, reducing the duration and intensity of NEB level is an important nutritional aspect in managing this period. In this regard, it has been hypothesized that these effects can be alleviated by increasing the energy density of the diets, in particular by the use of some raw materials rich in polyunsaturated fatty acids. Thus, the paper presents a series of preliminary data about the influence of a high polyunsaturated fatty acids concentrate mix fed to dairy cattle on: calving, body weight evolution, vaginal mucus resistance during the ovarian cycle with the moment of oestrous, milk yield, physicochemical parameters, fatty acid content and the incidence of bacterial postpartum infections.

Keywords: dairy cattle, reproduction, milk, polyunsaturated fatty acids

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0107.



Effects of dietary sorghum, as partial substitute of corn, on breast muscle chemical composition and amino acids profile in broiler chickens

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The experiment was conducted to determine the effects of dietary white sorghum (WS), as partial substitute (50%) of corn, on the chemical composition and amino acids profile of breast muscle (Pectoralis major) in broilers. Cobb 500 broilers (n=400) were randomly assigned to 2 groups with 4 replications per treatment. The broilers were fed with isocaloric and isonitrogenous corn-soybean meal control diets (C) or corn-WS-soybean meal diets (WS) for 35 d. The WS (9.91% CP and 3207 kcal/kg ME) proportion in diets was 275.4 g/kg (starter), 307.0 g/kg (grower) and 332.7 g/kg (finisher). The diets had similar content of digestible sulphur amino acids, lysine, calcium and available phosphorus. At the end of experiment, 4 broilers per replicate were slaughtered and breast muscle samples were collected. The HPLC method was used to determine the amino acid profiles of the meat samples. There was no effect (P>0.05) of the dietary sorghum inclusion, as partial replacement of corn, on chemical composition (dry matter, crude protein, crude fat and ash) of breast muscle (Pectoralis major) of broilers. The total amino acids content (TAA) of breast muscle did not differ significantly (P> 0.05) between C (79.76%) and WS (81.79%) dietary treatments. Similarly, no significant differences (P> 0.05) were found in contents of essential amino acids

(EAA; 39.40 vs. 39.90%) or flavour-related amino acids (FRAA; 38.40 vs. 39.26%) in breast muscle. Although, at levels of individual amino acids the breast muscle of WS group had higher contents of aspartic acid (+3.49%; P= 0.007), serine (+5.14%; P= 0.015), valine (+6.04%; P= 0.001), phenylalanine (+4.29%; P= 0.030), lysine (+6.13%; P= 0.046) and arginine (+5.01%; P= 0.001), and lower levels of sulphur amino acids: cystine (-12.7%; P= 0.003) and methionine (-10.58%; P= 0.001) compared to C group. In conclusion, the use of white sorghum, as partial substitute of corn in broiler diets, did not affect breast muscle chemical composition and had a positive effect of amino acids content (TAA, EAA and FRAA).

Keywords: broilers, white sorghum, corn, breast muscle, amino acids

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0105.

Comparative effect of ochratoxin A and aristolochic acid on the pig kidney

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Ochratoxin (OTA) and aristolochic acid (AA) are two of the etiological factors considered to be at the origin of the Balkan endemic nephropathy (BEN), an irreversible, chronic, tubulo-interstitial nephropathy described so far in Balkan Peninsula and in Romania. The disease is associated with various forms of upper urinary tract cancer. The present study compared the toxic effect of the two toxins on the kidney using the pig as an animal model. Compared with the control, consumption of a diet contaminated with 250µg/kg OTA affect the protein metabolism, as resulting from the significant increase of the concentration of total protein, albumin and creatinine in the OTA group with 14%, 10% and respectively 17% as compared with control group. Intoxication with 250µg/kg AA, significantly increased only the creatinine concentration with 4.3% as compared with the control. In the kidney of control pigs, histological investigations showed that the renal parenchyma exhibits normal architecture. In OTA group, the kidneys have small areas with mild tubular hypertrophy as well as tubes with cysts. On small surfaces, hypertrophic, hemorrhagic and slightly sclerotic corpuscles

are indicated. The microscopic analysis of sections of the kidneys of individuals intoxicated with AA also reveals a number of changes in the renal parenchyma due to urinary tract distensions. The epithelial cells that trap the urinary tracts exhibit degenerative histological changes consisting of hypertrophic processes and vacuolar cytoplasm. AA exposure was responsible in kidney for an increase of TNF-alpha and IFN gamma, while no difference from the control was observed for IL-1 beta, IL-4, IL-6, IL-8 or IL-10. Also, AA exposure induced significantly higher concentration of TNF alpha, IL-1 beta, IL-4 in kidney of intoxicated animals as compared with OTA intoxicated animals. In conclusion, both OTA and AA, induced toxic nephrotoxic and immunotoxic effects at the kidney level with important pathological consequences.

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0202.

Feeding female lambs with peas and soybeans as protein sources

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There is insufficient data on the direct use of grain legumes as protein sources in the feeding of ruminants and, in particular, of sheep and lambs. The purpose of this study is to track the growth and consumption of feed in female lambs for breeding in weight of 19.4 kg when replacing sunflower meal "Sunpro 46" with high protein content, with peas and thermally treated soybean grain. 30 female lambs of Pleven Black face breed were used. Lambs from all three groups received an equal amount of compound feed of 18% protein content. It was found that the thermally treated soybean and pea grains as protein sources in compound feed for lambs did not have a meaningful impact on the weight development of female lambs for breeding with weight from 19 kg to 28 kg. An average daily weight gain of 0,205-0,209 kg for female lambs was obtained in the three types of rations, respectively with the participation of sunflower meal "Sunpro-46" and grain of soybeans and peas. Feed intake per 1 kg weight gain is 4.9 kg DM, regardless of the protein source in the ration (sunflower meal, soybeans and peas).

Keywords: feeding, female lambs, peas, soybeans



Changes in composition, plant cell walls fibre components and enzyme digestibility of temporary and natural pasture

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Pastures are considered as the primary and most economical source of nutrients for herbivores. The purpose of this study was to compare changes in chemical composition, plant cell wall fibre component and in vitro enzyme digestibility of the forage from first growth of natural and temporary pasture. In 2017, samples of both pastures were given from Mid-April in 7 days to determine changes in composition and in vitro digestibility. The average crude protein is approximately the same for both grasses (12.39% and 12.94%) and showed a tendency to decrease from the beginning to the end of the period. The rate of change in CF was more dynamic in temporary pasture, which increased by 49.37%. For the same period, the increase in CF in natural pasture was 40.80%, respectively. NDF content increased from 46.67 to 58.16%, or average by 3.57% units per week in natural grassland, and in temporary pasture by 45.71% to 57.77% respectively, or by 3.68 % units per week. ADF of temporary pasture increased by 4.35% units per week, while in natural pasture increased by 3.57% units per week. ADL in natural pasture increased by 0.974% per week, while in temporary pasture more dynamic changes were found and ADL increased more

than twice for 4 weeks. Digestibility reduced at approximately the same rates in both pastures - temporary and natural by 24.21% and by 25.52%, respectively for period of 4 weeks.

Keywords: chemical composition, protein, fibre, in vitro digestibility, natural pasture, temporary pasture





The effects of grape waste bioactive compounds on the immune response and oxidative stress in pig kidney

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Nutrition is an important determinant of general health status, with especially focus on prevention and/or attenuation of the inflammatory-associated pathologies. There are important links between chronic kidney diseases, inflammation and nutritional strategies that may prevent or protect against undesirable inflammation and oxidative stress. The grape by-products are rich in polyphenols which may be beneficial in prevention of inflammatory, antioxidant and antimicrobial processes. The aim of the present study was to investigate the effect of a grape by-product (grape seed cakes-GS) on several inflammatory makers in pigs after weaning. After a feeding trial of 30 days with a control and an experimental diet containing 5% grape seed (GS), kidney samples were collected from weaning piglets. The expression, protein level and enzyme activity of pro- and anti-inflammatory cytokines, anti-oxidant enzymes and important mediators belonging to nuclear receptors were determined in renal tissues. Gene expression was evaluated by qPCR, cytokines concentration by using proteomic techniques, whereas the activity of anti-oxidant enzymes was determined by spectrometry using specific kits. Our results showed that GS cakes rich in polyphenols had no effect on TNF-alpha, IL-6 and IL-1 beta gene expression and protein concentration in kidney. By contrast, the gene expression and protein level of IL-8 and IFN-gamma were decreased in GS kidney. Anti-inflammatory cytokines IL-4 and IL-10 gene levels were increased in kidneys collected from GS piglets in comparison with controls, with no modification of protein levels between the two groups. The activities of anti-oxidant enzymes CAT and GPx were increased in kidney by GS, whereas SOD activity was unmodified. Also, the GS diet was associated with no modulation of mRNAs for nuclear receptors gene expressions in kidneys. In conclusion, our results demonstrated that GS rich in bioactive compounds such polyphenols could modulate inflammation and oxidative stress markers in kidney tissues. Further studies are necessary to elucidate the mechanism of action of GS compounds in case kidney inflammation.

Aknowledgements

This work was supported by funds from the Romanian Ministry of Agriculture and Rural Development through ADER program, Project No. 621.





Lactoglobulin, casein and myostatin polymorphism in Transylvanian Merino sheep

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Molecular markers assisted selection programs were developed worldwide for genetic intrinsic value and biodiversity preservation. On domestic animals were considered molecular markers associated with milk (beta-lactoglobulin, caseins and prolactin) and meat production (calpastatin, myostatin etc.). B-lactoglobulin (BLG) and caseins (CSN) are major proteins found in milk. BLG is the major whey protein and accounting for approximate 75% of the albumin fraction encoded by BLG gene. This gene is highly and specifically expressed in mammary gland during lactation. CSN are a family of proteins that exists in many isoforms ($\alpha s1$, $\alpha s2$, β , κ casein) and are main protein presented in milk, with a huge importance in milk processing. From all isoforms, kappa-casein (CSN3) has the most important role in improving milk yield. Myostatin, or growth and differentiation factor (GDF8) is the gene responsible with "double muscling" phenotype. This gene is very important in improving meat quantity and quality in carcasses. Objective of this study is to evaluate the polymorphism of BLG, CSN and GDF8 genes in a Transylvanian Merino sheep population and estimate his effect

over some economical traits. Using genomic DNA isolated from sheep blood, we evaluate BLG, CSN and GDF8 genetic polymorphism. The effect on economical traits will be estimate using animal model. The research results reveal an important effect of gene polymorphism over economical traits. Keywords: marker assisted selection, PCR-RFLP, B-lactoglobulin, kappa-casein, myostatin

Aknowledgements
 This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0601.

Assessment of the effects of dietary *Albanus sorghum* on some biochemical parameter in weaning piglets

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Weaning is the most critical period being associated with stress generators factors for piglets. Diet is one of these factors. Sorghum need less water compared to other grain and in dry years it can replace maize grain. This study evaluated the influence of *Albanus white sorghum*, low content in tannins, on certain zootechnical (weight gain, WG, average daily gain, ADG and feed conversion, g feed:g gain) and biochemical parameters (cholesterol, triglycerides, lipase). During 20d a biological trial was conducted on weaning piglets Topigs, 28 ± 3 days of age, 7.0 ± 0.96 kg weight. Twenty piglets were assigned randomly to two groups: control (C) fed with classical diet and experimental (E), 31% of maize was replaced by sorghum *Albanus* variety. The serum cholesterol and lipase concentration was determined by spectrophotometer method. The triglycerides and protein level were assessed by Analyser BS – 130. The WG and ADG were not significantly different. The feed to gain ratio was closed between groups (1.43 vs. 1.58). The cholesterol concentration was significantly higher in C group compared to E group (>21.25%). The lipase enzyme can influence appetite and influence beneficial cholesterol and triglyceride concentration. The level of lipase was 12.18% lower while the triglycerides concentration was 0.87% higher in E diet. In conclusion, although, sorghum digestibility is lower, the growth performances were not significantly altered. Except cholesterol concentration the other serum parameter did not differ significantly between groups.

Keywords: sorghum, cholesterol, triglycerides, protein, lipase, pigs

Acknowledgements

This work was supported by funds from the Romanian Ministry of Agriculture and Rural Development through ADER program, Project 611.



Determination of odd- and branched-chain fatty acids and purine derivatives in cow's milk using chromatographic methods

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The odd- and branched-chain fatty acids (OBCFA) are distinct compounds of milk and adipose tissue in ruminants [1] and their content is associated with rumen acidosis [2]. Extraction and determination of the following OCBFA was performed: anteiso C13:0; C13:0; iso C14:0, C14:0; anteiso C15:0; C15:0 ; iso C16:0; C16:0; anteiso C17:0; C17:0; iso C18:0 and C18:0.

The analysis of OBCFA was performed on a Gas-Chromatograph Agilent 7890 & 5975 Series MSD, equipped with a CP-Sil88 column (100m × 0.25mm × 0.2m; Chrompack Inc., Middelburg) using helium as the carrier gas. Peaks were identified by comparison of retention times with a GC reference fatty acids methyl ester standard.

Determination of purine derivatives (allantoin, uric acid, xanthine, hypoxanthine) in ruminant's milk using solid-phase extraction (SPE) [3] followed by using a high performance liquid chromatography with diode array detection (HPLC-DAD). We tested a few different solid phase extraction cartridges, Strata: SCX, NH2, C18-E, C8, Strata-X and PolySpher RP-18-Cat. The best recovery degree were obtain for: allantoin: 30.49-39,3% on Strata NH2; for uric acid: 100.06% on PolySpher RP-C18-Cat, for xanthine (85.87-88.79%) and hypoxanthine (84.66-92.02%) on

Strata SCX; In the milk samples the significant amounts of the uric acid and allantoin and small quantities of xanthine and hypoxanthine were found on SPE Strata-SCX cartridge.

Acknowledgements

This work is financially supported by the PN-III-P2-2.1-PED-2016-1921 2008-2011 in the frame of the third Romanian RDI Program.

Influence of dietary high levels of crude fiber in pigs diet (25-80 kg) on their productive performances

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The study was carried out to determine the effects of high levels of crude fiber ingredients in pigs' diet on their productive performances. The experiment was conducted for 64 days, on 9 pigs, divided into 3 groups (C, E1, E2), housed in individual metabolic cages with an average initial weight of 25.02±0.79 kg. The diet of C group, a conventional one, based on corn, wheat and soybean meal was characterized by: 17.50 crude protein (CP), 3.50% crude fiber (CF) and 3232 kcal/kg ME. Compared to C, E1 diet had 4% alfalfa meal and 12.36% sunflower meal added (17.50 CP, 6.50% CF and 3200 kcal/kg ME), whereas E2 diet had 6% alfalfa meal and 18.38% sunflower meal (17.50 CP, 7.50% CF and 3200 kcal/kg ME). At the end of the experiment there were no significant differences ($P \geq 0.05$) among groups although there was noticed an increase of body weight in E1 group (81.33±3.54 kg) and E2 group (81.00±4.93 kg), compared to C group (76.5±3.54 kg). Concerning the average daily gain it was noticed an increase at E1 (0.946±0.05 kg/day/head) and E2 (0.973±0.06 kg/day/head) compared to C (0.902±0.07 kg/day/head) but without significant differences ($P \geq 0.05$). The average daily feed intake was significant higher

($P \leq 0.05$) at E1 (2606.75±488.13 g feed /head /day) compared to C group (2458.90 g±599.91 feed /head/day) and E2 (2451.643 ±516.50 feed /head/day). There were no significant differences ($P \geq 0.05$) between groups concerning the feed conversion ratio. According to these results the productive performances were not affected by the dietary high level of fibre

Keywords: pig, alfalfa, sunflower, crude fibre, performances

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0402.

Effect of dietary rosehip oil given to broilers (14-35 days) reared at 32 °C on the caecal microbial population of broilers

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A feeding trial was performed on 90 Cobb 500 broiler chicks (14-35 days) assigned to 3 groups (C, C1,E1), 30 chicks/group, housed in an experimental hall with 32 °C air temperature, 36% humidity and 23 h light regimen. The conventional diet (group C), with corn and soybean meal as basic ingredients, had 3082.48 kcal/kg metabolisable energy and 19.99 % crude protein. Unlike the conventional diet (C), the C1 diet did not include monoensin in the premix. The difference between the C1 group and the experimental group (E1) was the addition of 2.5 % rosehip oil. The broilers had free access to the feed and water. At the age of 35 days, 6 broilers per group were slaughtered and samples of caecal content were collected for bacteriological examination (Enterobacteriaceae, E.coli, lactobacilli, staphylococci, Salmonella spp). Compared with group C, the pathogenic bacteria, E. coli and staphylococci (CFU), were significantly ($P \leq 0.05$) lower in the caecum content of group E1. Unlike group C1, the count of Enterobacteriaceae and E. coli colony forming units was significantly ($P \leq 0.05$) lower in the group fed diet with rosehip oil addition. Broilers fed E1 diet had a significantly ($P \leq 0.05$) higher number of lactobacilli (CFU) than the other groups. The data obtained from the microbiological analysis of broiler caecal content showed that Enterobacteriaceae, E.coli, staphylococci and lactobacilli were at a comparable level in groups C and C1. Salmonella spp. was absent in all the three groups. Throughout the experimental period, under heat stress, no mortalities

were recorded in any of the three groups. The use of rosehip oil in broiler diets (14-35 days) reared under heat stress (32 °C) favors the multiplication of probiotic bacteria (ex. Lactobacillus spp) to the detriment of pathogenic bacteria, which maintain broiler gut health.

Keywords: broiler heat stress, rosehip oil, caecal microflora population, gut health

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0401.



The amino acids profile of the meat from broilers fed with dietary food industry by-products (buckthorn, flaxseed and pumpkin meal)

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A feeding trial was conducted on 75, ROSS 308 (0-42 days) broilers, regarding on the determination of the amino acids profile of the meat (breast, thigh) in the case of using rations that included food industry by-products. The broilers, divided into three groups (C, E1 and E2), were housed in an experimental hall with controlled microclimate (average air temperature 27.07 ± 2.75 oC, humidity $64.80 \pm 9.57\%$, light 23h from 24h). The broilers were housed in digestibility cages (5 broilers/cage) that allowed daily feed intake and excretion. The broilers were phase-fed, depending on their age. In the starter phase (1-10 days) they received a conventional diet (C), and for the growth and finishing phases, compared to the C ratio, the experimental rations included in different proportions, depending on the growth phase: buckthorn and flaxseed meal (group E1), respectively pumpkin meal (group E2). Six broilers/group were slaughtered at 42 days and breast meat and thigh meat were collected and analysed regarding of the amino acid content. For the determination of amino acids profile a reversed phase high performance liquid chromatography (RP-HPLC) method was used. The

obtained results indicated a significant increase of the essential amino acids in the meat breast samples in the both experimental groups: for lysine were registered 8.73 ± 0.11 g/100 g DM (group E1), 8.77 ± 0.09 g/100 g SU (group E2), compared to the control group (8.37 ± 0.12 g /100 g DM). Similar results have been obtained with regard to the cystine content of the broiler breast: 0.82 ± 0.01 g/100 g DM (group E1), 0.87 ± 0.01 g/100 g DM (group E2) compared to the control group (0.79 ± 0.01 g /100 g DM). There were no significant differences for the amino acids found in the thigh samples.

Keywords: amino acid, by-products, broilers, breast meat, thigh meat

Acknowledgements

This work was supported by funds from the Romanian Ministry of Agriculture and Rural Development through ADER, Project No. 612.





Obtaining a feed additive with probiotic role for using in piglets in the weaning crisis

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For obtaining a feed additive with probiotic role, several strains of lactic acid bacteria have been isolated from segments of pigs intestine. The strains were assayed taxonomic and biochemical. It was identified microbial strains as *Lactobacillus acidophilus*, *L. plantarum*, *L. casei* and *L. paracasei*. The isolates have been analysed for their ability to synthesize organic acids (lactic acid, lactic phenyl, hydroxyphenyl lactic, propionic and acetic acid) which have the role to limit the pathogen bacteria proliferation (*E. coli*, *Salmonella* spp., etc.). The strains involve normal function of the digestive tract. Two strains were selected, *Lactobacillus acidophilus* and *L. plantarum*, which determine a production value of lactic acid 7,40 g/l, respectively 5,83 g/l. The selected strains were used to obtain an inoculum by natural mediums (corn, meal, soybean meal, molasses) and for obtaining a feed additive with probiotic role at the pilot station level. The new product presents a characteristic smell of lactic acid, sour taste and a concentration of 15×10^{10} UFC/g. In conclusion, the results suggest that the probiotic product can be used in feed of weaning crisis piglets in a rate of 3-5%.
Keywords: probiotic, lactic acid bacteria strains, piglets weaning crisis

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0106.

Effect of the *Salix alba* cortex extract on the productive performances of broilers (14-28 d) reared under heat stress (32°C)

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A feeding trial was conducted on 90, Cobb 500 broiler chicks (14-28 days) reared under heat stress, evaluated the effect of an extract from *Salix alba* cortex, on broiler performance, carcass and organ development. Broilers have been weighed individually assigned to 3 groups (30 chicks/group), housed in an experimental hall with 32°C constant air temperature, 36% humidity, and 23h light regimen. The conventional diet (group C), was with corn and soybean meal as basic ingredients. Compared to the conventional diet C (with monensin in the premix for the grower phase), diet formulation C1 didn't include monensin in the premix. Unlike the diet C1, the diet for the experimental group (E1) included 1% *Salix alba* cortex. The broilers had free access to the feed and water. Throughout the experimental period from 14 to 28 days, body weight gain was recorded weekly and feed intake was recorded daily. At the end of the experimental period, 5 chicks from each group were slaughtered in order to make measurements of the relative weight of carcass cuts and internal organs of broilers. All organs (breast length, width and weight; leg, liver, heart, spleen, bile and bursa of Fabricius weight; weight and length of the empty intestine; caecum length and pH) were weighed and measured individually. No significant differences ($P \leq 0.005$) were noticed in the end of the experiment between the two groups for the average daily feed intake (89.12g feed/day/chick/group C; 91.65 g feed/day/chick/group C1 and 90.72 g feed/day/chick/group E1, respectively) and for the live weight of the chicks at 28 days (1181.1 g, group C; 1172.59 g, group C1 and 1135.55 g, group E1). These results show that the analysed product meets the feeding requirements to be used as feed ingredients in broiler.

Keywords: broiler, *Salix Alba* Cortex, heat stress, carcass and organs, performances

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0401.



Testing of some DNA isolation methods from ruminal fluid

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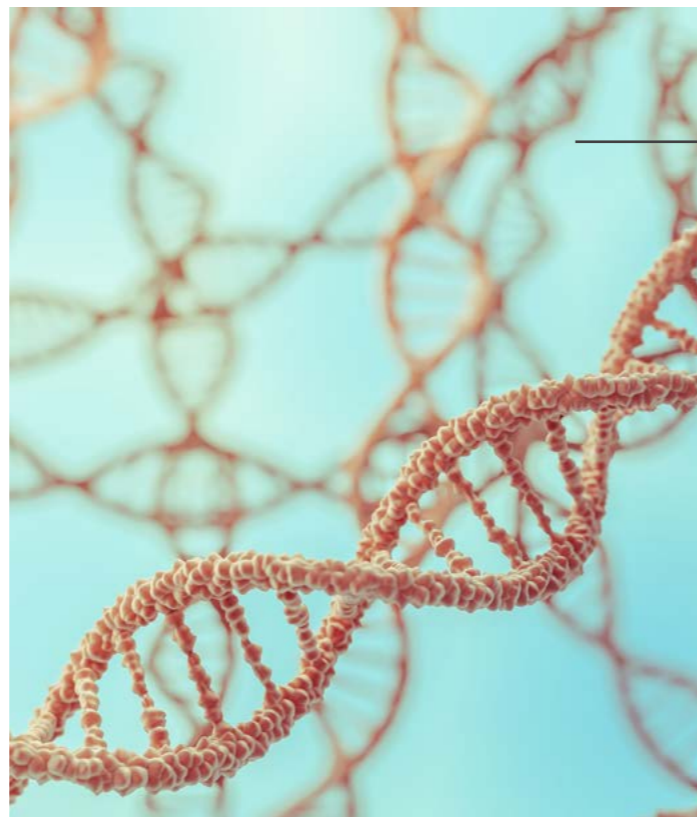
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Rumen is one of the most abundant habitats of microbial species, represented by both prokaryotes and eukaryotes, but predominantly bacteria. For molecular biology studies on the microbiota in ruminal fluid, irrespective of the molecular technique to be applied (standard PCR, DGGE, RT-PCR), it is necessary to isolate the DNA of interest from the sample (ruminal fluid, microbial culture, etc.).

The biological samples used in the experiments were represented by ruminal fluid, harvested from fistulized wethers, fed with different dietary ratios, as follows: initial stage "0" - classic ration (sunflower grist); experiment 1 - rations based on goats (flax, camelina, sunflower = control sample).

The main objective of the experiments was that of comparing several DNA isolation methods from ruminal fluid, in order to obtain quality amplifiable DNA. Based on the integrity, yield and purity of the obtained DNA, and on the simplicity of the method as well, we selected DNAzol method to isolate ruminal fluid samples that were analyzed by BOX-PCR and specie-specific PCR.

Keywords: DNA isolation, PCR, ruminal fluid



Comparative research for in vivo evaluation of Romanian local lamb breeds carcass quality

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Improving carcass composition is an important factor for the demand and consumption of lamb meat. Larger carcasses with lower fat content are two factors that influence positively lamb meat acceptance by the consumers. The purpose of our work was to evaluate in vivo the carcass quality of two local sheep breeds Palas Merino and Palas meat breed. Ultrasound technology was used to measure Longissimus Dorsi muscle properties on live animals: depth, area, perimeter and subcutaneous fat layer thickness. The measurements were performed on 62 Palas Merino lambs (47 males and 15 females) aged 133 days, with an average body weight of 30.79 ± 0.53 kg, and 62 Palas meat lambs (46 males and 16 females) aged 111 days, with an average body weight of 25.43 ± 0.53 kg. The ultrasound measurements were performed with an Echo blaster 64 using LV 7.5 65/64 probe, supplied by TELEMED ultrasound medical systems. The ultrasound images were recorded using Echo Wave II software version 1.32/2009. The first measurement point was 5 cm from the spine, at the 12th rib; the second measuring point was between 3rd and 4th lumbar vertebrae. The average values of the subcutaneous fat layer thickness, LD muscle depth, area and perimeter were: 1.98 mm; 21.32 mm; 9.06 cm² and 121.02 mm in Palas Merino lambs and 1.85 mm; 20.60 mm; 9.05 cm² and 124.75 mm in Palas meat breed lambs. The tests showing the significance of the differences between sexes showed

distinctly significant differences ($P < 0.01$) for LD muscle eye and perimeter in favour of the male Palas Merino lambs, while in the Palas meat breed, distinctly significant and significant differences ($P < 0.05$) were noticed between the two sexes only for LD muscle perimeter. The phenotypic correlations between body weight and LD muscle properties were determined. The Palas Merino lambs displayed close correlations between bodyweight at the time of measurement and LD muscle depth, eye area and muscle perimeter, with values of 0.574 - 0.770; on the other hand, the subcutaneous layer thickness is poorly correlated with the live weight. In the as Meat breed lambs, the correlations between bodyweight and ultrasound measurements are poorer, with coefficients of 0.206 - 0.757; while the coefficients for fat layer thickness ranged between 0.063 - 0.307. Further studies will characterize the other local breeds. The expectations for higher incomes from lambs with higher quality carcasses are a motivation for the farmers to develop strategies to improve lamb carcass value by selecting genetically superior animals.

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0301.



Studies concerning different levels of dietary fibre on pig meat quality (80 kg)

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The 8 weeks study was conducted on 9 castrated Topigs growing pigs, males, with an initial bodyweight of 25 kg. The pigs were assigned to 3 groups (C, E1, E2), housed in individual metabolic cages. The control diet (C), a conventional one was characterized by 17.5% CP, 3200 kcal/kg ME and 3.5% CF. To increase the dietary fiber level of the two experimental groups (E1 and E2), alfalfa (23.96% crude fiber) and sunflower meal (21.18% crude fiber) were utilized. Thus, the dietary fiber level within the experimental groups was: 6.5% fiber in E1 group (4% alfalfa and 12.36% sunflower meal) and 7.5% fiber in E2 group (6% alfalfa and 18.38% sunflower meal). At the end of experiment, all pigs were slaughtered according to Romanian legislation and meat (ham, sirloin, rack, neck, shoulder, belly) samples were collected.

For all analyzed samples there were significant increases ($P \leq 0,005$) of polyunsaturated fatty acids (PUFA fatty acids) concerning E1, E2 compared to group C. Of the total PUFA fatty acids, a significant increase was recorded for the omega $\Omega:6$ due to the fact that sunflower oil is rich in linoleic acid (51.85%). By using cellulosic raw materials, PUFA fatty acid levels have increased. Significant differences ($P \leq 0,005$) were recorded concerning average muscle thickness and

average meat percentage compared to group C. Of the experimental groups, the best carcass classification results were recorded in the E1 group with 6.5% cellulose (50% Class S and 50% Class E).

Key words: pigs, alfalfa, sunflower meal, fiber, meat

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0402.



Effects of cinnamaldehyde and carvacrol essential oils on the rumen parameters of wethers

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The trial aimed to assess the effects on the main rumen parameters of two natural essential oils compounds (EOC), cinnamaldehyde and carvacrol (commercial products with 95% purity), reported to bring beneficial effects in ruminants nutrition. The dose of EOC was 4.5 g/kg dietary dry mater, the substances were mixed in the compound feeds fed to wethers during the first meal of the day. The basal diet consisted of mash hay and alfalfa hay, while the compound feed contained cereals (maize and barley), sunflower meal and vitamin-mineral premix. The feeding trial was organised in a 3 x 3 Latin square experimental design, using three fistulated wethers, feed three diets: control (without supplementation), CIN (supplemented with cinnamaldehyde) and CAR (supplemented with carvacrol). The feed intake was not influenced by the addition of EOC (less than 3% differences). Also, the supplementation did not induce significant changes in rumen pH post-prandial evolution. On the other hand, some changes were observed in post-prandial evolution of ammonia concentration in the rumen liquid: lower concentration during eight postprandial hours in case of CIN and CAR supplementation, comparing with the control diet (-5 ... -8%). The dynamics of the total volatile fatty acid (VFA) were slightly influenced by the EOC supplementation: in CAR diet the peak of VFA levels occurred 4 hours later than in the case of CIN. However, acetate and propionate molar proportions did not differ among treatments. The average VFA concentration was lower in case of CIN, comparing both to CAR (-6%) and control (-9%). These results led to the conclusion that inclusion of pure (95%) cinnamaldehyde and carvacrol, in wethers diets, at a concentration of 4.5g/kg dietary DM, did not alter dry matter intake and did not significantly shifted the rumen parameters. Keywords: rumen parameters, essential oils compounds, cinnamaldehyde, carvacrol

Aknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0501.

The influence of alternative protein by-products, milk thistle and coriander seed cakes, on the rumen parameters of wethers

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The trial aimed to assess the effects on the main rumen parameters of two by-products obtained from the mechanical oil extraction, milk thistle and coriander seed cakes, included in wethers diets as total replacers of sunflower meal (~10% participation in the dietary dry mater).

The replacement was made in 1:1.2 ratio in order to maintain the same dietary supplies of protein and energy among experimental groups. The basal diet consisted of grass hay and oat hay, while the compound feed contained cereals (maize and barley grain), sunflower meal (or milk thistle or coriander seed cakes) and vitamin-mineral premix.

The feeding trial was organised in a 3 x 3 Latin square experimental design, using three fistulated wethers that were feed three diets: control (sunflower meal, SFM), MTC (where sunflower meal was total replaced by milk thistle cake, 31.6% in compound feed) and CSC (where sunflower meal was total replaced by coriander seed cake, 31.6%).

The overall consumption of the dietary ingredients was similar among the experimental groups. Also, the replacements did not triggered significant changes in rumen pH post-prandial evolution.

On the other hand, lower concentrations of ammonia in the rumen liquid were

observed along the 8 post-prandial hours, leading to lower averages in case of both MTC and CSC diets, comparing with the control diet (13% and 29%, respectively). The concentrations of the total volatile fatty acids (VFA) were influenced by the inclusion of oil extraction products differently: while use of CSC led to concentrations similar to the control, the MTC was associated with a 7% decrease.

These results led to the conclusion that total replacement of sunflower meal with CSC, while keeping constant the nutritive supply of the diets, did not influence the rumen parameters and, presumably, would not negatively influence the productive parameters when fed to ruminants, in similar feeding conditions. In case of MTC, the decrease of total VFA concentration may indicate potential issues that should be further investigated.

Keywords: rumen parameters, milk thistle cake, coriander seed cake

Acknowledgements

This work was supported by funds from the Romanian Ministry of Research and Innovation through Nucleus program, Project No. 1641 0501.



28-29 September 2017



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