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Brief account of INCDBNA activity, 1970-2015

H. Grosu, C. Dragomir, Rodica Criste, Ionelia Taranu, Elena Ghita, Mihaela Habeanu
National Research Development Institute for Animal Biology and Nutrition-Balotesti, Romania

The material presents a brief history of the activity Institute during the period from 1970 to 2015, in agreement with its denomination, corresponding to each historical period. It highlights the main achievements of the research-development activity (while mentioning their authors), from the development of the Romanian system of feeds evaluation to the international collaborations which enhanced the international visibility of the institute. The paper ends with a presentation of the areas of interest for the institute for the period 2015-2020.
Keywords: IBNA Balotesti, history, achievements, scientists, areas of interest

Animal Task Force: an overview

C. Dragomir
National Research Development Institute for Animal Biology and Nutrition-Balotesti, Romania

The structure, objectives and recent activities of the Animal Task Force (ATF) are presented. ATF was set up in 2011, with the objective of promoting sustainable and competitive animal production in Europe through knowledge development and innovation. ATF also endeavours to unite research and industry and to cover all different aspects in animal production: from feeding & animal nutrition to breeding & genetics, farming systems, environment, animal health and welfare, etc. ATF has a rich activity in identifying and promoting RD priorities at the European level, which are handed over towards Horizon2020, EIP-Agri, JPI FACCE, SCAR, etc. The development of the White Paper 2013 and its further updates as well as a flavour of the plentiful ATF yearly activities are described. Special stress is put on the development of ATF towards Central & Eastern Europe.
Keywords: Animal Task Force, activity, Central & Eastern European countries

Genetic information control upon metabolism

M. Paraschivescu
Romanian Academy of Agriculture and Forestry Sciences

The paper is trying to explain, using the triadic way of thinking, the authority of genetic information in controlling the Intermediate Metabolism (the qualitative one), at the level of genetic species, of genotypes and diploid or haploid genomes. Concerning Energetic Metabolism (the quantitative one) the importance of the body type of animals is stressed. Finally Intermediate Metabolism is considered as entirely at the level of genetic species, organisms and cells, while the efficiency of Energetic Metabolism depends of the body type imposed by the genotype and of the energy concentration of diets.
Keywords: triadic way of thinking, genetic information, genetic species, genotype, genome

Cracking the genomics beef code – genomic analyses for meat quality

Raluca Mateescu
Department of Animal Sciences, University of Florida, USA

The 2011 National Beef Quality Audit assessed the status and progress made towards improving quality and consistency of USA cattle, carcasses, and beef products. The only quality category identified by packers, food service buyers, and retailers for which those sectors are willing to pay a premium was “eating satisfaction”. Tenderness, juiciness and flavor are the major determinants of beef palatability and are often used to measure eating satisfaction. Eating satisfaction is of great interest to the beef industry as improving these traits should lead to increased beef demand.
The beef industry is using USDA grading system essentially based on marbling and maturity to predict the palatability of the meat from a beef carcass and communicate it to the consumers. Though the USDA grading system has served industry well, changes in consumers’ preferences, limitations in the ability of the system to predict eating quality and limited consumer understanding of how the system works are some of the problems associated with the system. By comparison beef is an expensive animal protein and what sets it apart are distinctive sensory attributes, or high palatability. Programs to improve eating experience when consuming beef and the ability to better predict the eating quality level for marketing purposes are critical to increase consumers’ confidence that quality expectations are met. If practices or traits that positively or negatively affect

eating experience are identified, then the beef industry can develop management and genetic programs designed to address these issues.

A genomic study was initiated to identify single nucleotide polymorphisms (SNPs) or chromosomal regions associated with different measures of beef palatability. Steaks from 1,720 Angus cattle were analysed by a trained sensory panel for tenderness, juiciness, connective tissue and beef flavour intensity. A genome wide association study was performed to estimate effects between 54,000 SNP genotypes and each phenotype. Additive SNP effects explained 28.6% of the variation in panel tenderness, 5% in juiciness, 22% in connective tissue, and 13.3% in beef intensity flavour. Further investigations are needed to identify causal variants to create new opportunities for identification of animals with desirable eating quality attributes.

Keywords: beef, genomic analyses, meat quality

Variance components and breeding values of birth weight in Holstein calves

Osman Karabulut[1], Durhasan Mundan[2], Önder Sehar[3]

1 Aksaray University, Fac. Vet. Med., Dept. Bioistatistics, Aksaray-Turkey; 2 Harran University, Fac. Vet. Med., Dept. Zootechnics, Sanliurfa-Turkey; 3 Republic of Turkey Ministry of Food, Agriculture and Livestock, Ankara-Turkey

In this study, it was aimed that estimation of the variance components and Best Linear Unbiased Prediction (BLUP) values of Holstein calves birth weight in Kocas State Farm, using Animal Model in MTDFREML package program. Pedigree and birth weight records of the calves (n=1099) between the years of 1992-2001 were used as research material. Year, birth type, sex and interaction of year – birth type were taken as fixed factors affecting the birth weight. Dam age was included into the analyses as a covariate. Variance components were calculated by using six different models of Restricted Maximum Likelihood (REML) technique. Heritability and Standard error were found as 0.39±0.077. As a result, birth weight of Holstein calves reared in Kocas State Farm can be increased through selection.

Keywords: Birth Weight, BLUP, Heritability, Holstein, REML, Variance Components

The compound feed production in EU. Challenges and perspectives

C. Pană,
USAMV- Bucharest, Romania

FEFAC members have provided final estimates for the compound feed production in EU-28 in 2014 to 153.4 mio. t. (around 302 kg per capita), 16% of the global production that is estimated at 964 mio.t (around 132 kg per capita).

The compound feed production in EU slightly decreased by 0.5% in 2014 vs. 2013 and similar trend expected in 2015 (-0.7% vs. 2014). Poland has been the only well performing member state with annual growth close to 7% and Germany recorded an increase by 2.3%. (Source: FEFAC Statistics 2014). The most important factor having impacted feed production is the Russian ban for pig meat and beef meat in February 2014. Industrial compound feed production in EU-28 per category: 33.6% poultry, 31.7% pigs, 27.3% cattle, 6.6 % others and 0.8% milk replacers. Feed material consumption by the compound feed industry in 2014 remained relatively stable: 48% for cereals, 27.5% for oilseed meals.

The most important challenge for compound feed industry in EU-28 is to reduce the protein deficit of 70 % (only 2% self-sufficiency for soya, 74% for sunflower +rapeseed, 67% for fishmeal and 31% self-sufficiency for total all protein sources). In the new Common Agricultural Policy (CAP) further initiatives are needed to stimulate local protein crops production and reduce the dependency on very few exporters of protein-rich feed material, for economic and strategic reasons. The Romanian Compound Feed Manufacturer Association (ANFNC) is a full member of the European Feed Manufacturers Federation (FEFAC) and is composed of over 50 member companies, including feed additive and feed manufacturing equipment suppliers and Mr Iani Chihaia, Executive Secretary of ANFNC is hoping next years to reach over 80 members.

The Romanian compound feed industry produced 2.5-3.0 million tons every year (54% represented poultry feed, 43 % pig feed, ruminant feed only 3%) and ANFNC President Iosif Pazuric believes than annual production could be doubled within the next ten years.

Keywords: compound feed production, feed industry, compound feed production in EU-28, protein deficit, Romanian Compound Feed Manufacturer Association-ANFNC

Valorisation of ethanol plants' by-products in Vietnam for animal feeding; an example of research collaboration between Romania and Vietnam

Chu-Ky Son[1] Ho Phu Ha[1], Pham Kim Dang[2], Nguyen Tien Thanh[1], Tu Viet Phu[1], Luong Hong Nga[1], Nguyen Ngoc Hoang[1], Do Khac Uan[1], Le Thanh Mai[1] Gina Cecilia Pistol[3], Daniela Eliza Marin[3], M. Gras[3], Mihaela Habeanu[3] and Ionelia Taranu[3]

1 School of Biotechnology and Food Technology, Hanoi University of Science and Technology (HUST), Hanoi, Vietnam; 2 Faculty of Animal Science, Vietnam National University of Agriculture (VNUA), Hanoi, Vietnam; 3 National Research Development Institute for Animal Biology and Nutrition (IBNA), Balotesti, Romania

Corresponding authors: son.chuky@hust.edu.vn; ionelia.taranu@ibna.ro

In ethanol industry, fermentation produces a co-product, a so-called dried distiller's grain with solubles (DDGS). Currently, the majority of the DDGS has been used as an ingredient for livestock feeds. In dry-grind processes, the fermentation beer is distilled and ethanol is recovered. The non-volatile components then leave this step as a product called whole stillage. The whole stillage contains the fiber, fats, protein, other unfermented components of the grain, and yeast cells. Whole stillage is usually centrifuged to produce a liquid fraction (thin stillage) and a solids fraction (wet distillers' grains). While wet distillers' grains, syrup, or the combination of both (wet distillers' grains with solubles, WDGS) can be sold as an animal feed, the combination of wet distillers' grains and syrup are often dried to produce dried distillers' grains (DDG) with solubles (DDGS) in order to greatly lengthen its shelf-life. Indeed, the composition of DDGS has been of great interest to researchers in the area of animal science, ethanol producers, and especially to the animal feeding industry as the majority of this has been sold as feed ingredients for livestock. National Research Development Institute for Animal Biology and Nutrition (IBNA), Romania and Hanoi University of Science and Technology (HUST) together with Vietnam National University of Agriculture (VNUA), Vietnam worked as partners in the EU-funded FP7 project entitled "FOODSEG" www.foodseg.net) which focused on food safety for enlarged Europe. Both IBNA, HUST and VNUA set up a joint project during 2014-2016 to valorize ethanol plants' by-products in Vietnam for animal feeding. The objectives of this project are to (i) improve the added value of bioethanol plants' by-products to produce high quality animal feed and decrease import of raw materials for the production of animal feed (ii) to characterize cassava- and rice-based DDG products and (iii) to improve the performance and the health status of farm animals (pig and poultry) by such DDG as feed supplement. This project is an example of joint research collaboration between Romania and Vietnam, which mobilize the complementary expertise from each partners to ensure the success of the project.

Keywords: ethanol, by-products, distillers dried grains, animal feeding

Characterization of the ovulatory response to the male effect with and without photoperiodic treatments on Carpathian and White of Banat goats

Zamfirescu Stela, Anghel Andreea, N. Dobrin, Jitariu Daniela
Constanta Ovidius University, Romania

It is well known that seasonality in goats is under photoperiodic control with long days inhibiting sexual activity and short days stimulating it (Bissonnette, 1941; Chemineau et al., 1999).In goats, reproductive patterns reflect the expression of a self-sustained endogenous rhythm which is synchronized or induced by photoperiod (Bondurant et al., 1981). However, other environmental stimuli, such as availability of food and social interactions should not be disregarded as potential regulators of seasonality of reproduction. (Restall, 1992; 1995; Walkden-Brown et al., 1993)

The objective of the experiments was the characterization of the ovulatory response on Carpathian and White of Banat goats after applies the photoperiodic treatments and the male effect.

The experimentally lot with Carpathian goats were maintained beginning with December 15th 2012 to March 15th 2013 on photoperiodic treatments of long days (16h of light and 8h of dark for 90 days) and from March 16th to June 16th 2013 on natural photoperiod. The control lot with Carpathian goats were maintained beginning with December 15th to June 16th on natural photoperiod. Female goats were isolated from males to the begging of the experiment and after than the goats were put in contact with bucks for realizing the male effect. The response to the male effect was compared using bucks and females treated or untreated with photoperiodic treatments. The male effect was applied on May 16th 2013 on experimental and control goats.

The experimentally lot with White of Banat goats were maintained beginning with February 15th 2013 to April 25th 2013 on photoperiodic treatments of long days (16h of light and 8h of dark for 70 days). To 26th April 2013 were introduced the melatonin implants on goats and bucks (1 implant/goat and 3 implants/bucks). After than the experimental goats, the control goats and the bucks goats were maintained beginning with April 26th to June 26th on natural photoperiod. Changes in sexual activity of males were studied on the experiment for evaluate the efficiency of photoperiodic treatments and melatonin implant to confirm the sexually active status of males at day 0.

For bucks the parameters studies were: plasma testosterone levels were analysed in blood samples collected once a week, body weight and testicular volume were measured every two weeks. On goats were studies following parameters: plasma progesterone levels in blood samples collected at D-10 to D0, the occurrence of oestrus after male introduction was studied daily on all animals from D0 to D13, the ovulatory response to

the male effect was studied at all animals, by daily analysis of plasma progesterone levels in blood samples taken once a day from D0 to D13, the timing of male-induced fertile ovulations was examined on every goat by the analysis of the LH surge between D5 and D9.

Relevant scientific information is presented separately for each bread. In Carpathian goats the ovulatory response of goats to the male effect was 85% for experimental goats and 40% for control goats. The occurrence of oestrous after male introduction was found 75% for experimental goats and 35% for control goats.

For Carpathian goats the fertile oestrus was 70% to treated goats with artificial photoperiod and 30% for goats treated with natural photoperiod. On this breed the photoperiod treatments in association with male effect applied had the stimulant capacity to increase the sexual activity on goats. In White of Banat goats the ovulatory response of goats to the male effect was 85% for experimental goats and 45% for control goats. The occurrence of oestrus after male introduction was found 70% for experimental goats and 30% for control goats.

For White of Banat goats the fertile oestrus was 60% to treated goats with melatonin implant and natural photoperiod and 25% for goats treated with natural photoperiod. On this breed the photoperiod treatments (artificial photoperiod of long day and melatonin implant) in association with male effect applied on goats had the stimulant capacity to increase the sexual activity on these.

Key words: seasonality in goats, male effect, photoperiodic treatments.

Determination of arterial oxygen saturation in new-born lambs by pulse oximetry

Halil Selçuk Biricik[1], Hayrettin Çetin[2], Süleyman Ganidağli[3], Nihat Şindak[4]

1 Aksaray University, Faculty of Vet. Med., Dept. Surgery, Aksaray- Turkey; 2 Adnan Menderes University, Faculty of Vet. Med., Dept. Obstetrics & Gynaecology, Aydın-Turkey; 3 Gaziantep University, Faculty of med., Dept. Anesthesiology, Gaziantep-Turkey; 4 Siirt University, Faculty of Vet. Med., Dept. Surgery, Siirt- Turkey

The objectives of this study were to determine peripheral oxygen saturation by pulse oximetry in new-born lambs and applicability of this technique in practice. Fifty new-born Awassi lambs were used as material. The pulse oximetry probe was placed on the upper lip and peripheral oxygen saturation (SpO2) measured at 5, 10, 20, 30, 40 and 60 minutes after delivery. In addition, arterial blood samples were withdrawn at 30 minutes and arterial oxygen saturation (SaO2) measured using a portable blood gas analyser. Mean

SpO2 values were 72.70±3.54, 79.38±4.93, 85.06±3.99, 91.94±3.44, 92.10±2.71 and 94.66±2.56 per cent at these measurement times, respectively. Mean SaO2 value at 30 minute was 93.06±2.80 per cent. There was no significant difference between SpO2 and SaO2 values measured at this time interval. As a result, it was concluded that determination of arterial oxygen saturation by pulse oximetry on farm conditions instead of blood gas analyser could be easily performed as a reliable technique.

Keywords: pulse oximetry, lamb, arterial oxygen saturation

Contribution of some internal factors to the exteriorization of production metabolism in the Botosani Karakul breed

Gheorghe Hrincă
Research and Development Station for Sheep and Goat Breeding, Popauti-Botosani, Romania

The paper analyses the interaction way of several intermediate metabolism parameters in their interference reactivity status in the metabolic networks and production traits in sheep belonging to the Botosani Karakul breed by multiple linear correlation analysis. The intensity of this interaction is rendered by the multiple linear correlation coefficients (Rm). On the basis of these coefficients, this study estimated the participation share of the intermediate metabolism parameters to the expression of metabolism production by the determinant analysis or the factor analysis. Quantifying the contribution of these internal factors on production traits of this breed was done by calculating the determination coefficient (R_m^2 or A total).

Metabolic parameters taken into question for this study were represented by five internal constant of organic nature (glycaemia, lipemia, cholesterolemia, proteinemia, haemoglobinemia), blood indices that are involved in a significant proportion in the production metabolism. The other series of variables for the correlational analysis was represented by the sheep productions (meat, wool, milk).

In lambs, the five internal constants are the best correlated with the growth rate of their body. In adult animals, the correlation of these internal constants is more intense with body weight than with wool production. A less significant interrelation is established in adult females between milk production and these blood parameters.

As a result of the configuration of these correlation coefficients, one can see that in the Botosani Karakul breed, regardless of age and gender of the sheep, the five blood organic constant in their joint action have a more important contribution to increasing the meat production (lambs, adult females, adult males), their contribution is lower to achieving

the wool production (adult females and adult males), because it to achieving the milk production this contribution be low (adult females).

Defining the characteristics of the linear multiple correlations between metabolic parameters and traits production as well as the quantification of the contribution of these internal factors in profiling the production metabolism of the Botosani Karakul breed are sustainable tools for the mathematical modelling concerning the conversion of circulating substances within internal environment (derived in their turn from the feedingstuff intake) into livestock productions in full compliance with the imperatives of an efficient animal husbandry.

Keywords: Botosani Karakul sheep, metabolic parameters, production traits

Utilization of corn distillers dried grains with solubles (cddgs) in broiler breeder hens' diets

Georgeta Ciurescu
National Research & Development Institute for Animal Biology and Nutrition, Balotesti, Romania

A study was conducted to examine the productive performance, egg quality and reproductive parameters of Arbor Acres broiler breeder hens fed different levels of corn distillers dried grains with solubles (cDDGS). In total, 2280 Arbor Acres broiler breeder hens, 28 wk. of age, were allocated for 8-wk. experimental period in a feeding trial consisting of tree dietary treatments (0, 10, and 15% cDDGS), and four replicates per treatment. Each replicate consisted of a group of 190 hens (male to female ratio 1:10). All experimental diets were prepared as iso-protein (16%) and isocaloric (ME 11.7 MJ/kg) and with similar content of total sulphur amino acids (TSAA), calcium and available P. The use of cDDGS up to 15% in broiler breeder hen diets did not have adverse effects on hen-day egg production, egg weight, feed intake, feed conversion ratio and egg mass ($P > 0.05$). Inclusion of DDGS in the diet led to a significantly increased yolk colour intensity ($P < 0.001$), while having no effect on egg contents and eggshell quality, such as eggshell weight and egg specific gravity. Reproductive parameters were not affected by the cDDGS levels fed. Based on the results from the present study, cDDGS could be included at up to a level of 15% in Arbor Acres broiler breeder hens' diet without any significant detrimental effects on the egg production, egg interior and exterior quality or reproductive performance.

Key words: breeding hens, cDDGS, egg quality, reproductive parameters

Estimation of the genetic parameters for test-day milk yield in Montbeliarde cattle

Rodica Ștefania Pelmuș, H. Grosu, Cristina Lazăr, C. M. Rotar, Andreea Vasilachi, M. A. Gras, R. A. Uță, Elena Ghiță
National Research-Development Institute for Animal Biology and Nutrition, Balotesti, Romania
Corresponding author: pelmus_rodica_stefania@yahoo.com

Genetic parameters are relevant in selection program for animal breeding. The use of the best method for genetic evaluation of dairy cattle is very important in production. The test day model appears to be a better alternative of 305-day lactation model because early selection on the basis of test-day could reduce generation interval. It could economize the genetic evaluation of dairy animals and improve accuracy of evaluation. The objective of this study was to determine the genetic parameters represented by heritability for test-day milk yields and the correlations between test-days milk yields, the breeding value for Montbeliarde cows in first lactation. The model used was random regression test day animal model. The data set consists of 254 test day records from 28 cows in first lactation. The average number of test day per lactation was about nine. The heritability estimates ranged from 0.356 at the 100th day in milk to 0.437 at the 10th day in milk.
Key words: animal breeding, genetic parameters, random regression model, test day records.

Identification of calpastatine (CAST) gene in Teleorman Black Head lambs for improving meat quality evaluation by marker assisted selection

Cristina Lazar, A. M. Gras, M. C. Rotar, Gina Cecilia Pistol, Rodica Stefania Pelmus, Elena Ghiță
National Research-Development Institute for Animal Biology and Nutrition, Balotesti, Romania

The objective of this study was identification of calpastatin gene correlated with carcass quality in 105 Teleorman Black Head lambs. Calpastatin is endogenous in nature, being a specific inhibitor of calpain protease that regulates the rate and degree of meat tenderization after slaughter. An increased rate of skeletal muscle development may be the result of a decrease in muscle protein degradation due to reduced calpain activity and increase of calpastatin (*CAST*) activity. *CAST* is the gene most used for marker assisted selection for traits such as double muscle and meat tenderness in animals.

PCR – RFLP method was used to determine polymorphism of calpastatin gene (CAST). Blood samples were extracted and PCR products were digested with *Hae III* enzyme. CAST amplicon was obtained by PCR reaction and CAST DNA fragment was visualized on 622 pb. By RFLP reaction tree CAST genotypes were observed: *AA, AB* and *BB*. Genotype *AA* has 4 restriction fragments on 447 pb, 432 pb, very closely one each other visualized in one single band and another two fragments of 188 pb and 173 pb. Genotype *AB* has 5 bands: 447 pb, 432 pb, 394 pb, 188 pb and 173 pb. Genotype *BB* was obtained after RFLP reaction and a 394 pb fragment was obtained. *CAST* gene polymorphism showed tree variants and *AA* allele was on the first place with 73.68% followed by *BB* with 20% and only with 6.32% for heterozygote variant *AB*. Allele *A* frequency recorded 77%, while allele *B* has only 23%. *CAST* genotype showed Hardy Weinberg disequilibrium emphasizes a potential empiric selection detrimental for genotype *AB*. The literature has numerous scientific studies highlighting that *BB* genotype of CAST gene is associated to reduced values for live weight, average daily gain and back fat thickness, traits that are very important for the evaluation of Kivircik sheep carcass. The genotype frequencies in their case was 72.91 for AA, 22.66 % for AB and only 4.43 % for BB, 1.89 % lower than in the Teleorman Black Head lambs (Yilmaz et al., 2014). The study will continue with the *CAS*T gene effect and the influence on the carcass quality in order to improve the selection criteria and to keep for reproduction the best individuals.

Keywords: Teleorman Black Head lambs, calpastatine gene, marker assisted selection

Research on the bioproductive potential for dairy goats of some feed sources from various areas of Romania

I. Voicu[1], I. Surdu[2], Ana Cişmileanu[1], Andreea Anghel[3], Dorica Voicu[1], Irina Topoleanu[3]
1 INCDBNA Baloteşti; 2 S.C SIAT S.A. Bucureşti; 3 ICDCOC Palas, Romania

For the development of software that calculates the feeding requirements and optimises the diets for dairy goats, it is necessary to know the feeding characteristics of the different categories of feeds in terms of energy, protein and mineral contents. We analysed several feed samples provided by goat farmers and owners from various areas of Romania: hays from crops and natural pastures, silages and haylage, straw, cereal crops (corn, wheat, barley, oats, triticale), as well as some by-products (meals, brans, draff, marc).

The chemical analyses of these samples have shown that their protein content is rather different from the content of similar feeds given by the reference tables and also between the different sources of the same product. These differences are due most

probably to the soil moment of harvesting, storage conditions, soil and climate factors, origin, because in increased amount of imported feeds has been marketed lately, with various chemical composition.

As range of values, the protein content of the corm for instance, varied from 5.1% (Dambovița), to 7.8% on real DM basis (Constanța), values which are significantly lower than the average table value of 9.2%. The alfalfa hay supplied by the farmers also showed different values of the protein content (on real DM basis), from 12.3% (Lugoj farm) to 19.1% (Bodeni-Buzău farm). The nutritive values of the forages used by the farmers are not usually similar to those shown in the reference tables of values.

The fail to use the real feeding values of the forages supplied by the farmers more underestimates than overestimates the total value of the diets, which impairs the response of the animal to the supply of nutrients, if the improper feeding quality of the forages is not taken into consideration.

NUTRICAP software is an interactive database which allows the permanent updating of the real feeding value of the dietary feeds, using the mathematical model of evaluating the feeding value of the forages for goats based on the real gross chemical composition, determined by analyses, and on the digestibility coefficients, determined experimentally.

Keywords: feeding value, feeding requirements, diet optimization, gross chemical composition

Effect of *Mentha piperita* on some morphological characteristics of intestine in Japanese quails (*Coturnix coturnix japonica*) (3).

Abdur Rahman[1], Ibrahim Sadi Cetingul[2], Ismail Bayram[2], Cangir Uyarlar[2], Eyup Eren Gultepe[2], Hikmet Keles[3], Aykut Ulucan[4]

1 Department of Animal Nutrition, University of Veterinary and Animal Sciences, Lahore (Jhang Campus), Pakistan; 2 Department of Animal Nutrition and Nutritional Diseases, 3 Department of Pathology, Faculty of Veterinary Medicine, Afyon Kocatepe University, Afyonkarahisar, 03200, Turkey; 4 Department of MedicalServicesandTechniques, BingolUniversity, 12000, Bingol, Turkey.

Corresponding author Email: abdurrehman@uvas.edu.pk

Poultry industry progressed rapidly in the last few decades with drastic genetic developments after undergoing strict selection process. Developments in the poultry sector was revolving around the sole objective to provide cheap protein source to the underfed human population which was otherwise not possible by other meat sources to fill the gap. To improve and maintain high growth rate in poultry, low dose antibiotics are commonly used as growth promoters and as prophylactic measures. Drug residues in

meat and eggs lead to a challenging problem of drug resistance in human. To avoid drug resistance, it is necessary to explore new ways which can replace antibiotics without compromising the performance of birds. Some natural herbs are claimed to possess the potential for improved growth rate by manipulating intestinal morphology. For this purpose the present study was designed to evaluate the effect of *mentha piperita* dried leaves supplementation in diet on the intestinal properties of quail. A total of 180 quail of 15 weeks age were divided in 6 groups having 30 birds in each. Each group was subdivided into 6 subgroups which consist of 5 birds in each. Experiment lasted for 70 days. Groups A (control group), B, C, D, E and F were fed diets containing 0% , 1%, 2%, 3%, 4% and 5% dried ground peppermint leaves. Results revealed that in peppermint supplemented groups villus height remained unaffected ($P>0.05$), crypt depth was observed significantly higher ($P<0.05$) in groups B and F while tunica muscularis thickness was recorded higher ($P<0.0$) in group D as compared to control group A. It is concluded from the results that *mentha piperita* supplementation can improve the morphological characteristics of intestine which may result in better nutrient utilization and ultimately better performance of the birds.

Keywords: *Mentha piperita*, extract, villus, crypt, quail

Potential use of pot marigold and St John's wort for enrichment of eggs with liposoluble bioactive compounds

Iulia Varzaru, Arabela Untea, Tatiana Panaite

National Research Development Institute for Animal Biology and Nutrition (IBNA), Balotesti, Ilfov, Romania

Corresponding author email: iulia.maros@ibna.ro

Pot marigold and St John’s wort are plants used in traditional medicine, being a source of bioactive compounds such as carotenoids and liposoluble vitamins. Among carotenoids, lutein and zeaxanthin are considered as protective nutrients for visual function, and can also be found in the egg yolk where their levels can vary depending on the composition of the hen’s diet.

The present study was conducted to investigate the effects of two medicinal plants (pot marigold and St John’s wort) included in the laying hens ration, on the transfer of vitamins A and E, lutein and zeaxanthin into egg yolks.

A total of sixty, 61-week-old Lohmann Brown hens were randomly assigned into 3 groups (C, E1, E2) and housed in metabolic cages (2 hens / cage, 20 hens / group). The hens were fed on a corn-soybean meal based diets supplemented with 5 % pot marigold (E1), and 5

% St John's wort (E2), for 3 weeks. Diet treatment of the E1 reduced (P≤0.05%) the feed intake and egg weight. After 3 weeks, lutein and zeaxanthin concentrations significantly (P≤0.05%) increased in the eggs from E1 and E2 groups, compared with C. Vitamin A determination revealed an increased content with 155.1 % in E2, and 56.1 % in E2, when compared to C. The group with 5 % St John's wort (E2) included in the diet, registered the highest content of vitamin E, which was with 54.2 % higher then that observed for C. A significantly (P≤0,05%) higher vitamin E concentration was found also in egg yolks from hens fed diets including 5 % pot marigold (E1); the percentage of increment reached 20.3 % compared to C group.

The results of the present study suggest that the inclusion of pot marigold and St John's wort in laying hen's diet can increase significantly (P≤0.05%) the concentrations of lutein and zeaxanthin, vitamin A and E in eggs.

Keywords: lutein and zeaxanthin, liposoluble vitamins, medicinal plants, enriched egg

Progress in evaluation of diversity in Pinzgau cattle based on molecular markers

R. Kasarda[1] N. Moravčíková[1], V. Šidlová[1], Z. Krupová[2], E. Krupa[2], O. Kadlečík[1]

1 Department of Animal Genetics and Breeding Biology, Slovak University of Agriculture in Nitra, Slovak Republic; 2 Research Institute of Animal Production, Prague, Czech Republic

Corresponding author: radovan.kasarda@uniag.sk

The aim of this study was to evaluate the genetic diversity in Pinzgau cattle based on analysis of genomic data. Biological samples were obtained from in total 19 proven sires with reliability of breeding value over 65%. Except one, each of selected bulls was born in Slovakia. Genomic DNA was genotyped using Illumina BovineSNP50 BeadChip. The analysis of genetic diversity across selected individuals was carried out based on determination of the heterozygosity level and inbreeding-like effects across group of bulls characterized by FIS fixation index. Moreover the effective population size based on linkage disequilibrium extent was assessed. After applying quality control of genotyping data 41,541 of autosomal loci passed the above filtering criteria and were usable for following statistical analysis. The average heterozygosity were observed at level 0.38 ± 0.01. The average negative value of inbreeding-like FIS index signalized higher proportion of heterozygous genotypes across and within all analysed individuals. Both of selected parameters indicated no reduction of heterozygosity across evaluated breeding bulls. The analysis of genomic data based on evaluation of linkage disequilibrium extent may provide an alternative view to estimation of effective population size in comparison to

pedigree data. In present study 34,672 pairwise LD values producing by syntenic adjacent marker pairs were useable for estimation of Ne. The observed recent effective population size in analysed group of bulls was outside the critical limit that describing a breed as endangered. But the value close to the minimum effective population size signalised the need of tools to monitor the selection process in relation to the control of inbreeding. Results of present study confirmed the importance of the molecular markers utility in the prediction of genetic variability loss and also in managing of breeding programs in small livestock population.

Keywords: Pinzgau cattle, BovineSNP50 Bead chip, genetic diversity, SNP genotyping

Effect of dietary chromium on oxidative stability of egg yolk

Arabela Elena Untea, Tatiana Dumitra Panaite, Maria Gabriela Cornescu, Iulia Varzaru
National Research Development Institute for Animal Biology and Nutrition (IBNA- Balotesti), Romania
Corresponding author: arabela.untea@ibna.ro

The antioxidant effect of dietary supplementation with 150 µg/kg chromium picolinate (CrPic) on the lipid oxidative stability of conventional vs. ω3-fatty acid (FA) - enriched eggs was compared.

A 2 × 2 factorial arrangement was applied, in order to study the influence of four dietary treatments (184 Lohmann Brown layers, aged 49 – 52 weeks, 46 hens/group). The hens from the control group (C) received a conventional diet (based on corn, rice bran and soybean meal). The formulation of the experimental diets differed from C group diet by inclusion of 7% camelina meal/flaxseed meal mix (E1); 150 µg/kg CrPic (E2); 7% camelina meal/flaxseed meal mix and 150 µg/kg CrPic (E3).

At the end of experiment, fresh eggs samples were analysed to determine lipid oxidation, using peroxide values and conjugated dienes as primary oxidation products and malonaldehyde content (TBARS) and conjugated trienes as secondary oxidation products.

The results showed an antioxidant effect of dietary CrPic supplementation on ω3-FA enriched eggs (peroxide value: 6.88 ± 2.63 meq/kg (E1) and 4.23 ± 1.54 meq/kg (E3); conjugated dienes: 48.26 ± 13.02 mmols/g (E1) and 20.15 ± 12.14 mmols/g (E3); TBARS: 0.0311 ± 0.007 mg/kg (E1) and 0.0137 ± 0.002 mg/kg (E3); conjugated trienes: 65.45 ± 10.65 mmols/g (E1) and 53.94 ± 5.95 mmols/g (E3).

Keywords: egg yolk, oxidation, chromium picolinate

Influence of pelleting process and material particle size on the stability of retinol acetate

Nedeljka Spasevski, Đuro Vukmirović, Jovanka Lević, Bojana Kokić, Ljiljana Kostadinović, Sanja Popović, Olivera Đuragić
University of Novi Sad, Institute of Food Technology, Novi Sad, Serbia
Corresponding author E-mail: nedeljka.spasevski@fins.uns.ac.rs

In this study, the effect of conditioning time and material particle size on the stability of vitamin A (retinol acetate) during pelleting process was investigated. Corn was used as test material and it was milled in a hammer mill with the sieve openings of 2, 3 and 4 mm in diameter. In this way different granulation of samples was obtained. Vitamin A was added in powder form prior to conditioning. Samples were conditioned at a temperature of 80°C without subsequent retention, and also with retention of 5 and 10 minutes in conditioner after the target temperature was achieved. Afterwards, material was pelleted at the temperature around 70 °C. Vitamin A was determined using High Performance Liquid Chromatography (HPLC). In samples milled to pass through 2 mm sieve, the concentrations of vitamin A decreased by 13.36%, 14.05% and 17.35% in comparison to unprocessed sample, with the conditioning time of 0, 5 and 10 minutes, respectively. Conditioning of samples for 0, 5 and 10 minutes, milled to pass through 3 mm sieve, caused vitamin A decrease of 13.99%, 14.71% and 20.96% in comparison to unprocessed sample, respectively. The highest decrease of vitamin A was recorded in samples milled to pass through 4 mm sieve and was 14.98%, 16.03% and 22.86% in comparison to unprocessed sample, but with conditioning time of 0, 5 and 10 minutes, respectively. Based on the obtained results, it can be concluded that with the increase of retention time during conditioning and also with increase in particle size of material, decrease in vitamin A content is higher.

Keywords: retinol acetate, conditioning, particle size, pelleting process, HPLC

The effects of lactic acid bacterial and enzyme inoculants on the fermentation, aerobic stability and feed value of low dry matter maize silages

Mehmet Levent Ozduven, Bayram Akgül, Berrin Okuyucu
Namik Kemal University, Agricultural Faculty, Department of Animal Science, Tekirdag, Turkey;
Corresponding author e-mail: lozduven@nku.edu.tr

This study was carried out to determine the effects of lactic acid bacteria (LAB) and enzyme inoculants on the fermentation, aerobic stability and in vitro organic matter digestibility characteristics of maize silages. Sil-All (Alltech, UK) and Microbios (Cuprem®, USA) were used as lactic acid bacteria+enzyme mixture inoculants. Inoculants were applied to silages at 6.00 log10 cfu/g levels. Maize was harvested milk stage of maturity and ensiled in 1.0-l special anaerobic jars, equipped with a lid enabling gas release only. The jars were stored at 25±2°C under laboratory conditions. Three jars from each group were sampled for chemical and microbiological analysis 2, 4, 8 and 45 days after ensiling. At the end of the ensiling period all silages were subjected to an aerobic stability test for 5 days. In addition, in vitro organic matter digestibility of these silages were determined. Both inoculants increased characteristics of fermentation but impaired aerobic stability of triticale silages. Both inoculants decreased neutral and acid detergent fibre content and increased in vitro organic matter digestibility of silages.
Keywords: maize, lactic acid bacterial inoculants, enzyme, fermentation, aerobic stability, cell wall content, in vitro organic matter digestibility

Effect of adding various proportions of sorghum grains to the compound feeds, as alternative to the classical energy cereal grains, on fattening steers performance

Dorica Voicu, I. Voicu, Andreea Vasilachi
National Research-Development In statute for Animal Biology and Nutrition Balotesti, Romania

The effects of dietary sorghum grains, used as alternative to the classical energy cereal grains in compound feeds, were tried out in experiments on 21 Romanian Black Spotted fattening steers with an average initial weight of 256 kg. The steers were assigned uniformly to three groups which received compound feeds with various proportions of sorghum grains. Thus, the control group (C) received no sorghum grains in the compound feed, while groups E1 and E2 received 15% and 25%, respectively, sorghum grains in the compound feed. Alfalfa haylage was used as bulk forage for all groups. The experimental

results have shown that the use of sorghum grains in the compound feeds didn't change the feed intake and didn't affect diet palatability. The dietary sorghum grains produced lower average daily weight gains in the two experimental groups (1,250 and 1,266 g/steer/day in the first and second experimental groups, respectively) compared to the control group (1,306 g/steer/day), but the differences were not statistically significant (P>0.05). The cost of feeding, expressed in Euro/steer/day, and in Euro/kg gain, were slightly higher in the experimental groups compared to the control group, whose feed conversion ratio, expressed in energy and protein, were, however, much higher.
Keywords: steer, alfalfa haylage, sorghum grains, weight gain, feed conversion, economic efficiency

Advances in alfalfa breeding for increased quality at NARDI Fundulea

Maria Schitea[1], Lenuţa Drãgan[1], Georgeta Oprea[1], Elena Petrescu[1], Rodica Diana Criste[2], Margareta Olteanu[2], I. Voicu[2]

1 National Agricultural Research and Development Institute Fundulea, 915200 Fundulea, Călăraşi, Romania; 2 National Research & Development Institute for Animal Biology and Nutrition, Baloteşti, Ilfov, Romania

Corresponding author e-mail: schitea@ricic.ro

This paper presents the results which were obtained in alfalfa breeding program in Romania, at NARDI Fundulea during last years. Alfalfa is the most important forage crop in Romania. The main objectives in alfalfa breeding are: improving dry matter yield, quality, as well as biotic and abiotic stress tolerance. The objective of this work was the evaluation of quality of new alfalfa cultivars. Forage quality can be improved by increasing the leaf/stem ratio, which could be achieved by selecting genotypes with rich foliage, short internodes and empty stems. Developing cultivars tolerant to frequent cutting is also a possibility to improve the quality. Selection for increased forage nutritional value is often associated with reductions in other traits, such as forage yield, disease and/or insect resistance, and stress tolerance. This depend on the breeder's ability to select the genotypes in which the negative correlations are not very strong. In the study were included 15 alfalfa genotypes, 7 registered cultivars and 8 new synthetics. The results were from 2012, the third year of vegetation, from the second cut. The stage of cutting was between budding stage - beginning of flowering. In the field were determined yield, leaf/stem ration, number of internodes, resistance to biotic and abiotic factors (NARDI Fundulea) and the feeding value were estimated for crude protein (CP), crude fibre (CF), neutral detergent fibre (NDF), acid detergent fibre (ADF), digestible organic matter (DOM, g/kg) and net energy (NE, kcal/kg.), nutritive units in milk (IBNA

Balotesti).The leaf/stem ration were comprised between 36-39%, the number of internodes 10.0-11.9; the best one were new cultivars Teodora and Cezara (registered in 2013) with 39% leaves/stem ration, followed by new synthetics F 2014-09, F 2013-09, F 2017-08, compared with the checks, Magnat and Daniela with 36-37%. For all feeding value criteria was found a relatively large scale of variation, for instant between 19.42 – 21.85% for CP, the best one were new cultivars Teodora (21.85%CP), F 2113-09 (21.29% CP) and Cezara with 21.13% CP. Crude fibre content varied between 23.12% (F 2014-08) and 29.53% at the check Daniela. Low content in crude fibre had Roxana, Sandra, Teodora and F2105-09 (24.78-25,54%). NDF content varied between 37.2 g% (Roxana) and 42,89 g% at the F 2112-09 and ADF content varied between 24.67 g% (Roxana) and 29.35 g% at the Daniela(one of the check).The net energy value of the forage were comprised between 1216 – 1333 kcal/kg DM. On the top were the cultivars F 2014-08, Teodora, Roxana, Sandra, comparatively with the check Daniela (1216 kcal/kg DM). The nutritive units in milk content was between 0.92 (F2014-08) and 0.84, Daniela. The new alfalfa cultivars are the results of simultaneous selection for yield, quality and adaptability; tested in different ecological areas of our country, they outyielded the control with 5-6% for yield (dry matter), and with 10-12% in crude protein and nutritive units in milk. The best one was the new cultivar Teodora, with 3473 kg/ha crude protein and 14664 nutritive units in milk.

Keywords: alfalfa, breeding, quality, digestibility.

Influence of extrusion process on free fatty acid content in linseed-sunflower meal co-extrudate

Dušica Čolović[1], Radmilo Čolović[1], Nedeljka Spasevski[1], Bojana Ikonić[2], Catalin Dragomir[3], Vojislav Banjac[1], Olivera Đuragić[1]

1 Institute of Food Technology, University of Novi Sad, Serbia; 2 Faculty of Technology, University of Novi Sad, Serbia; 3 IBNA-Balotesti, Balotesti, Ilfov, Romania

Corresponding author: nedeljka.spasevski@fins.uns.ac.rs

Linseed and linseed based products are being increasingly used in animal nutrition due to their favourable fatty acid composition. However, fatty acids are extremely susceptible to oxidation, especially free fatty acid. Therefore, following paper is presenting how several independent extrusion parameters influenced free fatty acid content (FFA) in linseed-sunflower meal co-extrudate. FFA content increases during extrusion due to mechanical treatment and mixing of the material, which enables better contact between enzyme lipase and substrates. FFA in this experiment ranged from 3.04% to 8.27% of

oleic acid in fat phase. According to the results obtained, the most significant influence on FFA during extrusion showed starting moisture content of processed material ($p < 0.00001$). Increase in starting moisture content of the material inactivated lipase which is responsible for liberation of fatty acids from triglycerides, thus decreasing FFA. The influence of the extruder screw speed was practically negligible compared to influence of moisture content, while increase in the total area of die openings decreased temperature in extruder barrel since the resistance to the passage of material through the die was weaker. Therefore, an enzyme inactivation was less pronounced, so the FFA values were higher.

Keywords: extrusion, free fatty acid, linseed, moisture content

Forage sources for the fattening of beef cattle: corn and sorghum silages

Sevilay Gul[1] Levent Coşkuntuna[2], Fisun Koç[2]

1 Vocational School of Technical Sciences Plant and Animal Production Department Namık Kemal Unıversity, Tekirdağ, Turkey; 2 Department of Animal Science, Faculty of Agriculture, Namık Kemal University, Tekirdağ, Turkey

Corn silage is intensively used feeding all cattle on the modern farm; growing animals, beef cattle, dry cows and lactating cows. Corn silage feeding strategies vary depending on animal age and level of production. It must be supplemented with protein, mineral and sometimes energy to meet the animal's nutrient requirements. Sorghum is one of the major cereal in the semi-arid regions of the world where it is an important food and feed crop. The increased popularity of grain and forage sorghum silages for dairy and beef cattle production can be attributed to their desirable ensiling traits and potential for competitive whole-plant dry matter (DM) yields compared with corn.

Corn and sorghum silages are versatile feeds that can be supplemented so that they are satisfactory for part of most growing and finishing rations. Harvesting corn as silage and planting forage sorghums for silage have the advantage that they maximize beef production per acre compared to harvesting these crops by other methods and other cropping programs. Another important advantage is that harvesting, storage and feeding can be completely mechanized. However, as the costs of machinery, fuel, and labour have increased, the cost of harvesting silage has increased more rapidly than harvesting as grain.

Key words: sorghum, corn, silage, beef cattle, feed

Study concerning the ultrasound measurements of *Longissimus dorsi* muscle and subcutaneous fat thickness in White Tsigai breed lambs

Elena Ghiţă, Cristina Lazăr, M. C. Rotaru, Rodica Pelmus, M. Gras
National Research Development Institute for Animal Biology and Nutrition (INCDBNA), Balotesti, Romania
Corresponding author e-mail: elena.ghita@ibna.ro

Consumers are increasingly interested in healthy foods and usually prefer lean meat. There is a direct correlation between the intake of animal fats and the higher risk for cancer and heart diseases. This is why the selection of meat animals is important to produce leaner carcasses. The ultrasound technology can be used to predict the quality of carcasses or to select the reproducers with higher qualities. Worldwide, this technology has been used in selection programs for sheep to improve their development and carcass traits. In Romania, this ultrasound method for the evaluation of carcass quality in sheep, on live animals, has not been used before. This paper is part of a larger study that aims to characterize the suckling lambs and the growing lambs of the local breeds in terms of *Longissimus Dorsi* muscle properties and of the subcutaneous fat layer by ultrasound. The purpose of the paper is to evaluate the properties of the *Longissimus Dorsi* muscle (depth, area and perimeter) and the thickness of the subcutaneous fat layer on live animals (White Tsigai lambs, a local breed) by ultrasound. The studies were performed on growing lambs aged 200 days, 38 males and 42 females, with a body weight of 27.91 ± 0.67 kg and 25.88 ± 0.47 kg, respectively. The measurements were performed with an Echo blaster 64, with LV 7.5 65/64 probe, supplied by TELEMED ultrasound medical systems. The ultrasound images were recorded and analysed with Echo Wave II software, version 1.32 /2009. The first measuring point was 5 cm from the spine, at the 12^{th} rib, while the second was located between the 3^{rd} and 4^{th} lumbar vertebrae. The average values for the fat layer thickness, and for *Longissimus Dorsi* muscle depth, area and perimeter were 2.20 mm, 21.41 mm, 9.68 cm^2 and 126.38 mm in males and 2.15 mm, 21.08 mm, 9.19 cm^2 and 124.34 mm in females. After the use of Fisher's test, the results show significant ($P<0.05$) differences between the measurements for the two sexes in terms of body weight at the time of measurement and muscle eye area. The differences were not significant ($P>0.05$) for the other traits (fat layer thickness, *Longissimus Dorsi* muscle depth and perimeter). The phenotypical correlations between body weight and ultrasound measurements were significant, the highest coefficients being for muscle depth (0.62-0.69) and muscle area (0.82-0.86). The correlations between body weight and subcutaneous fat layer thickness are much weaker.

Keywords: White Tsigai lambs, ultrasound measurement, subcutaneous fat layer thickness, *Longissimus Dorsi* muscle depth, area and perimeter

Use of different additives in grape pomace effects of some microbiological parameters

Levent Coşkuntuna, Uğur Boylu
Namık Kemal University Agriculture Faculty Department of Animal Science, Turkey

This study was carried out to determine feed value of grape pomace. For this purpose taken from the grape pomace Tekirdağ wine factory glass jars filled with various additives obtained by the addition of silage as a source of food availability were investigated. Enzyme, Inoculants, Enzyme+Inoculants, Molasses and Formic acid was used as silage additives. Silage as the fermentation pH, Dry matter, Crude protein, Crude ash, Crude fiber, Acid detergent fiber (ADF), Neutral detergent fiber (NDF) and Acid detergent lignin (ADL) analysis and microbiological analysis were conducted. In white grapes, these values respectively after silage 3.60-3.69, %38.92-40.93, %9.74-10.20, %28.39-31.43, %7.09-9.03, %52.24-52.69, %58.50-58.67, %41.82-42.09 that were found between. White grape found in the values after aerobic stability, respectively 3.41-5.58, %43.84-44.70, %5.66-10.22, %29.86-30.73, %17.24-17.87, %53.06-53.54, %59.91-60.25, %42.17-42.45 that was found to be. In red grapes after silage has been found between these values 3.49-3.61, %35.90-36.28, %11.30-11.60, %28.43-29.14, %9.81-11.16, %50.54-52.05, %55.12-55.54, %36.36-36.89. These values then the stability of the red grapes were found 3.49-4.30, %37.37-38.01, %11.52-11.25, %28.99-30.12, %18.80-20.82, %50.28-51.07, %54.85-55.31, %36.56-37.04.

In white grapes after silage additives used in the analysis of Dry Matter control, enzyme, enzyme+ınoculant and formic acid is no significant difference between the statistical sense ($P>0.05$).

Keywords: grape pomace, silage, feed additive

The amino acid profile and quality of by-product obtained by processing of rapeseed as potential protein-energy nutrient

Sanja Popović[1], Š. Kormanjoš[1], Ljiljana Kostadinović[1], Nedeljka Spasevski[1], Z. Nježić[1], Tatiana Yanyuk[2], V. Myronchuk[2]

1 University of Novom Sadu, Institute of Food Technology, Novi Sad, Serbia; 2 National University of Food Technology, Kyiv, Ukraine

Corresponding author: sanja.popovic@fins.uns.ac.rs

Accurate knowledge of the amino acid profile of animal nutrient is crucial for a successful feed combining since a lack of some essential amino acids such as methionine, lysine and threonine can limit the nutritional efficiency of the feed. Concerning vegetable proteins, as well as high oil content, rapeseed is a valuable raw material, known as a high-quality energy meal. After technological processing of rapeseeds, before the drying and storage, the significant amounts of useful and useless waste products stand out. The mentioned useful by-products could present an alternative and economical source of dietary protein for feed. Estimation of nutritional value of this by-product is of great interest aiming to meet the nutritional requirements of animals. Beside the presence of high valuable components, rapeseed by-products contain a certain amount of inhibitory substances such as glucosinolates, which can cause goitre, haemorrhagic liver, bitter taste, and reduced performance in animals. Based on these facts, the usage of useful by-products obtained by processing of rapeseeds should be followed by the thermal treatment which aims to inactivate or reduce the amount of present inhibitory substances. The aim of the present study was to investigate the amino acid composition and quality of useful by-products obtained by rapeseed processing which are intended for animal nutrition. The examined raw by-products contained considerable amounts of protein and fat. It was recorder very similar amino acid profile of rapeseed by-products such as present in other valuable oil plants. The heavy metal content in samples met the requirements of the current Regulations on the quality of feed, as well as aflatoxin content. Based on the obtained results, it could be concluded that useful by-products obtained by rapeseeds can be used in animal nutrition as high valuable nutrients.

Keywords**:** rapeseed, by-product, amino acid profile, feed nutrition

Effect of linseed co-extrudates addition into a broiler chickens diet on fatty acid composition of leg meat

Predrag Ikonić, Dušica Čolović, Tatjana Tasić, Đorđe Okanović, Jasmina Gubić, Sanja Popović, Jovanka Lević
Institute of Food Technology, University of Novi Sad, Serbia
Corresponding author: predrag.ikonic@fins.uns.ac.rs

The experiment was conducted in order to investigate the influence of diet supplemented with linseed co-extrudates on fatty acid composition and sensory quality of chicken leg meat. Broiler chickens were fed a mash diet until slaughter at 35 days of age. Two diets, control (C) and linseed (Lin), were assessed with the aim of increasing the content of n-3 polyunsaturated fatty acids and evaluating their influence on proximate composition and sensory properties of leg meat. The L diet was formulated with two types of co-extrudates (5%), linseed-soybean meal (starter diet) and linseed-sunflower meal (finisher diet). 120 broiler chickens were assigned to each diet. The use of L diet enriched significantly ($P<0.05$) the content of α-linolenic (ALA) (3.37 % vs. 8.24%), EPA and DPA (EPA+DHA, 0.16% vs. 0.33%) fatty acids in meat and drastically reduced the n-6/n-3 ratio (10.5 to 3.55). Sensory attributes of roasted leg meat samples were negatively affected by supplementation with linseed co-extrudates.
Keywords: broiler chickens, leg meat, linseed, co-extrudates, fatty acids.

Haematological blood parameters in indigenous goats

Vasilika Dini[1], Fatgzim Latifi[2], Pëllumb Zalla[1]
1 Faculty of Veterinary Medicine, Agricultural University of Tirana, Albania; 2 Faculty of Agriculture and Veterinary, University of Prishtina "Hasan Prishtina", Kosova, Albania

The study was conducted on indigenous Martaneshi race goats, which bred in Lushnja. Normal haematological values of blood of the goats were studied, such as: determining the number of red blood cells and haemoglobin, determining the number of leukocytes and leukocyte formula. The results of blood analysis have a great significance and indisputable role in assessing the health condition of the animal. Clinically healthy animals were monitored for haematological and biochemical parameters. The blood samples were analysed in terms of erythrocyte and leukocyte counts, haemoglobin concentration, haematocrit, MCH, MCV and MCHC values.

The results obtained from this study show that largest number of red blood cells resulted in spring, while leukocytes resulted in summer. Haemoglobin level had no significant fluctuation from one season to another.

Keywords: goat, haematological parameters, blood, leukocyte formula

Reducing losses in crop harvesting forage grass to obtain hay

R. Ciupercă[1], D. Cherciu[2], V. Vlăduț[1], Lucreția Popa[1], I. Antoce[2], Ancuța Nedelcu[1], C. Cheptea[2], Vasilica Stefan[1], E. Marin[1]

1 National institute of research-development for machines and installations designed to agriculture and food industry - INMA Bucharest; 2 S.C. MECANO FUC S.A

The present paper addresses the problem of reducing losses in crop harvesting forage grass to obtain hay by conducting experimental research on determining quality indicators of a trailed windrover prototype that performs in a single pass, mowing, crushed and leaving on the ground continues swath to dry naturally al and nutritional quality growth. Experiments have been carried out by experts from INMA Bucharest on lands of SCD PAJISTI Vaslui and their results contribute to promote serial manufacturing of the trailed windrover at SC MECANO FUC S.A.

Keywords: harvesting forage, mowing, crushed and leaving

Regeneration of degraded grasslands, essential operation for the success of their enrichment with high productivity and nutritional value species

E. Marin[1], D. Cherciu[2], Anișoara Păun[1], C. Cheptea[2], D. Manea[1], B. Istrate[2], G. Gheorghe[1], Marinela Mateescu[1], A. David[1]

1 National institute of research-development for machines and installations designed to agriculture and food industry - INMA Bucharest; 2 S.C. MECANO FUC S.A

In this paper the authors approaches the increase problem of the quality agricultural products vegetal and animal, through performing some experimental researches about determination of working qualitative indices of a prototype which performs of regeneration degraded grasslands through overseeding directly in the grassy carpet of some species which contain nutrients. The experimental researches have been carried in the laboratories of INMA Bucharest, and their results contributes to promotion series manufacturing of the machine for regenerate grasslands to S.C.MECANO FUC S.A.

Keywords: regeneration, degraded grasslands, overseeding

Prebiotic effect of *Heliantus tuberosus* inulin, on Plymouth Rock Barat chickens

M. Culcescu[1,2], Roua Popescu[2], A. Popovici[2], Gh. Stoian[2]
1. S.N. Institutul Pasteur S.A., Bucharest, Romania; 2. University of Bucharest, Dept. of Molecular Biology and Biochemistry, Bucharest, Romania;
Corresponding author e-mail: roua.g.popescu@gmail.com

Control of intestinal pathogens in the early stages of the intensive rearing chickens may be the best strategy to reduce the infectious pressure that can cause intra/extradigestive, respiratory, septicaemia infections. Increasing constraints on the use of antibiotics as antimicrobials have led to study of different alternative methods. The aim of this study was to investigate the dietary effects of inulin oligosaccharide as therapeutic action like a prebiotic of *Helianthus tuberosus* (Jerusalem artichoke) tubercles. On the other hand we tried to evaluate the role of *Helianthus tuberosus* powder (50% dry substance) on the productive performance of chickens, nutritional perspective as metabolic accelerator and as environment intestinal protector and immune response activator.

The biologic effect of Jerusalem artichoke powder has been realized on 16 chicken Plymouth Rock Barat, allocated in the following four treatment groups: L1 (4 chicken- Starter II fodder 1-18 days/ 1739g / water *ad libitum*), L2 (4 chicken- Starter II fodder 1-18 days/ 1730g/ lot with -10% loss, water *ad libitum* + 2 mL E.coli strain 4293 GDP - APEC (Avian pathogenic E. coli- avian origin; 1996; CRB +; SERR; iss +; ompA +; FimH + culture in the day 6-18), L3 (4 chicken- Starter II fodder in the day 1-3; Starter II fodder: 5% artichokes in the days 8-18/ 1730 g/lot -10% loss, water *ad libitum* + 2 mL E.coli culture in the days 6-18), L4 (4 chicken- fodder Starter II in the days 1-3; Starter II fodder: 50% artichokes in the days 3-7; Starter II: 5% artichokes in the days 8-18/ 1730 g/lot -10% loss, water *ad libitum* without E.coli culture).

The evaluation was done daily for a period of 18 days by weighing batch and feed intake and at the end of the experiment it was evaluated serum biochemical parameters; E. coli strain recovery used in the classic study by PCR exam and evaluation immunostimulatory effect at the cellular level by histopathology.

(1) Administration artichoke in feed lots L3 and L4 led to an increase in average daily gain per lot by approximately 34% compared to groups L1 and L2 with the same amount of feed used / day / lot; (2) Bacteriological examination and PCR results showed that the E. coli PIB 4293 strain used daily in drinking water for lots L2-L3, was recovered, which proves that the gut population with that strain occurred without expressing clinical symptoms or macroscopic lesions issues; (3) There is an immunomodulatory effect of product from L4 cases expressed in lymphocytic hyperplasia at lymphoid follicles level of

bourse Fabricius and from the cecal tonsils level; (4) Increased weight gain can be explained by the degree of intestinal absorption potentiating more intensely expressed in cases in group L3 and L4; (5) Histopathological examinations in these cases revealed a secretory gland hyperplasia of intestinal submucosa accompanied by regional hyperplasia epithelium glandular. Also there is a deepening of the intestinal crypts and a reduction in necrotic desquamation processes of the epithelial cells from gut.
The results of this study demonstrate that administration of Jerusalem artichoke powder in the chicken feed lead to an increase in weight gain, a better feed conversion, a decrease in the degenerative and inflammatory processes, as well as potentiating of the immunomodulatory effect and a decrease of triglycerides and cholesterol total level.
Keywords: Plymouth Rock barred chicken, Jerusalem artichoke, prebiotic effect

Effect on egg cholesterol level when using camelina (*Camelina sativa*) meal in laying hens diet

Rodica Diana Criste[1], Tatiana Dumitra Panaite[1], Mariana Ropota[1], V. Criste[2], Anca Bercaru[1]

1 National Research-Development Institute for Animal Biology and Nutrition (IBNA) Balotesti, Romania; 2 National Research – Development Institute for Industrial Ecology– ECOIND, Bucharest, Romania

Corresponding author: criste.rodica@ibna.ro

Even though egg is an extremely valuable food due to its high nutritional value, consumers show a certain concern in regard to egg consumption because of cholesterol content. The objective of this study is to evaluate whether the presence of camelina meal (by itself or together with the flaxseed meal) can determines a lower cholesterol level of the egg yolk. A seven weeks experiment was conducted on 120 Lohmann Brown laying hens (55 weeks of age). Birds were divided in 3 groups (C, E1, E2), accommodated in improved cages. The basal structure of combined feed was characterized by 16% CP and 2651 kcal/kg ME. The difference between the diets of experimental groups and the control group (C) was established by the inclusion of camelina meal (2%) in E1 and camelina meal (2%) and flaxseed meal (2%) in E2 diet. In the first, third and seventh week, 18 eggs/group were randomized collected. After evaluating the physical parameters of quality, these 18 eggs/group were constituted by 6 samples yolk/group (3 eggs/sample) to determine cholesterol content. Cholesterol yolk samples was determined by gas chromatography method in accordance with ISO 12228:1999. Cholesterol content (g/whole egg) registered at C (266.317±4.872 mg cholesterol/egg) was significantly (P≤0.05) higher than E1 (222.60±9.526 mg cholesterol/egg) and E2

(216.66±9.024). The cholesterol level of experimental groups decreased by 13.87% (E1) and by 18.65% (E2) respectively, compared to that of C group eggs.
Keywords: laying hens, camelina, flaxseed, egg, cholesterol

Effect of using chelated trace elements in broiler diets on tibia mineralization

Rodica Diana Criste, Tatiana Dumitra Panaite, Arabela Untea, Olteanu Margareta, Soica Cristina
National Research-Development Institute for Animal Biology and Nutrition (IBNA), Balotesti, Romania
Corresponding author: criste.rodica@ibna.ro

One of the problems observed in highly productive caged broiler in the modern poultry industry is poor bone quality related mainly to osteoporosis. Most of studies on nutrition effects on bone quality have been focused on macrominerals (Ca, P) and vitamin D3. Although it is known, that enzymes related with some trace elements are important in mineralization process, the number of research on relationship between trace elements and bones quality is limited.
Within this context, an experiment was conducted on 120 broiler (37 de weeks), assigned to three groups (C, E1, E2), 40 broiler/group. All groups received a similar diet formulation (17.96% CP and 2724.31 kcal/kg ME). Compared to the diet formulation for group C, the diet formulations for groups E1 and E2 also included chelates with amino acids for Fe, Mn and Zn. The chelated trace elements have been introduced in the premix for group E1 at the level of the inorganic salts from the premix of group C. The for group E2 included amounts of chelated trace elements that were 25% lower than in groups C and E1. Six broiler per group have been slaughtered in the end of the trial (according to the Romanian legislation, Law 43/11.04.2014, directive 2010/63/EU) and tibia was collected and assayed for the dry matter and bone mineralization. The dry matter was significantly (P≤0.05) higher in group E1 (52.32 %) compared to C (45.90%) and E2 (47.36%). The highest proportion of ash was also determined for group E1.
Keywords: broilers, organic chelates, tibia, dry matter, ash

Influence of high fibre diet formulations for layers, on the production performance

Tatiana Dumitra Panaite[1], Rodica Diana Criste[1], Margareta Olteanu[1], C. V. Panaite[2], D. Dragatoiu[2]

1 National Research-Development Institute for Animal Biology and Nutrition (IBNA), Balotesti, Romania; 2 University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania,

Some feed ingredients are used in limited amounts in layer diets because of their high fibre content, despite their affordable price and high protein levels. A five-week experiment was performed on 216 Tetra layers (28 weeks, stage 1 GOC) to observe the effect of diet formulations enriched in fibre on layer performance. The layers were housed in modern three-tier cages (4 layers per cage) and fed on two modules of diets with 6 and 7% dietary fibre. The layers were assigned to 9 groups: control group (C), module I (C1; E1-a; E1-b; E1-c) and module II: C2; E2-a; E2-b; E2-c. The control diet (corn, soybean meal and sunflower meal based) had 4.29% fibre. The diet formulations for module I differed from the control diet by the fibre level (6%), while the experimental groups differed by the inclusion of cellulolytic enzymes (E1-a), phytogenic additive (E1-b) and a mixture of enzyme + additive (E1-c). The diet formulations for module II had 7% fibre, while the experimental ones (E2-a; E2-b si E2-c) differed by the inclusion of the same additives as for module I. the experimental results showed that the layers from module I had an average daily feed intake (ADFI) comparable with those from the control group, but all the 4 groups with 7% fibre had a significantly ($P \leq 0.05$) lower ADFI than group C. among the groups with 6% fibre, the ADFI of E1-c (enzyme + additive) was significantly ($P \leq 0.05$) higher than in E1-a and E1-b. In group E1-c (6% fibre + enzyme + additive) the laying percentage was significantly ($P \leq 0.05$) higher than in E1-b and E2-a. Except for egg weight from group E1-c (62.76±1.731 g), all the other groups had eggs with a significantly lower weight than in group C (62.814±1.466 g)

Keywords: layers, fibre, diet formulations, enzyme, eggs

Effects of the dietary protein levels and protein-oleaginous sources on carcass fatty acid composition in broiler chickens

Anca Gheorghe, Mihaela Hăbeanu, Mariana Ropotă, Nicoleta Aurelia Lefter, Georgeta Ciurescu

National Research Development Institute for Animal Biology and Nutrition (INCDBNA), Balotesti, Romania

Corresponding author: anca.gheorghe@ibna.ro

The present study was conducted to determine the influence of different dietary protein levels and two protein-oleaginous sources on carcass fatty acid composition in broilers at 42 days of age. Twelve hundred broiler chickens (Cobb 500) were randomly divided in 6 groups with 4 replications per treatment. Broilers were fed 6 different isocaloric diets in a 3 x 2 factorial design with 3 levels of protein [medium protein (MP), high (HP) and low (LP)] and 2 protein-oleaginous sources [camelina cake (CC) and canola meal (CM)]. The proportion of CC and CM in broiler diets was 80 g/kg. At slaughter broilers (n=4) from each replicate were randomly selected for carcass analyses, including fatty acid profiles. Gas chromatography method was used to determine the fatty acid composition. The results of this study indicated that dietary protein level or protein-oleaginous sources had no significant effect (P>0.05) on the chemical composition of carcass. The fatty acids profile of carcass was not affected (P>0.05) by the dietary protein level, but was positively influenced by the use of CC as protein-oleaginous source. Thus, feeding CC diets led to a significant increases in n-3 fatty acids (P=0.03), and especially α-linolenic acid (P=0.02) in carcass compared with CM diets. This effect is associated with the presence of long chain n-3 fatty acids [eicosapentaenoic (P=0.07) and docosahexaenoic (P=0.03)] in carcass. In addition, the use of CC decreased significantly n-6:n-3 PUFA ratio of carcass (4.06:1 in CC diets compared with 8.98:1 in CM diets; P<0.01), with real benefits for human health. These results showed that LP diets can ensure similar carcass quality than HP or MP diets and confirm that the CC is a valuable dietary source of n-3 fatty acids for broilers.

Keywords**:** broilers carcass, n-3 fatty acids, protein, camelina cake

Ochratoxin a modulates inflammation in the spleen of weanling piglets

Daniel Eliza Marin, Gina C. Pistol, M. Gras, Monica Motiu, Ionelia Taranu
National Research Development Institute for Animal Biology and Nutrition (INCDBNA), Balotesti, Romania

Ochratoxins are fungal secondary metabolites produced during storage by fungus of the genera *Aspergillus*, mainly in tropical and warmer regions and by *Penicillium verrucosum*, in temperate and colder areas (Varga et al., 1996). The most commonly occurring and most toxic member is ochratoxin A (OTA) (Hagelberg et al., 1989). OTA has a multiple toxicity, being nephrotoxic (Denli and Perez, 2010), genotoxic (Cosimi et al., 2009) and immunotoxic (Khatoon et al., 2013). According to the Commission Recommendation no. 576/2006 concerning the presence of OTA in products intended for animal feeding, the maximum level admitted for OTA in complementary and complete feeding stuffs for pigs is 0.05ppm. The aim of the present paper was to investigate the effect of OTA as the guidance value recommended by UE (50ppb) on inflammation and oxidative stress in the spleen of weaned pigs. A feeding trial was conducted to evaluate the effect of a OTA-contaminated diet on inflammation (cytokines: TNF alpha, IL-1 beta, IFN-□, IL-8, IL-4, IL-10, IL-17 other molecules involved in inflammatory processes: Nf-kB, e NOS and iNOS) and markers of oxidative stress (catalase, superoxide dismutase, glutathione peroxidase, heat shock protein 70, nuclear factor erythroid 2–related factor 2) in the spleen of the weaned pigs. They were fed on a corn-soybean meal basal diet and randomly assigned to either a control (diet without mycotoxin) or OTA (50 ppb). In order to evaluate effects of OTA on the above gene expression and synthesis in liver, using real-time PCR and respectively ELISA assays. Our results showed that OTA intoxication significantly decrease the concentration of IL-10 in the spleen of the intoxicated piglets, where no effect was observed for the other investigated cytokines. Also, 50 ppb of OTA significantly decrease the expression of IL-17, and slightly increase the expression of genes coding for eNOS and NfKB. However, the exposure of piglets to 50 ppb of OTA has no effect on the markers of the oxidative stress. In conclusion, even the recommended level of 50 ppb of OTA intoxication result in low modifications of the expression of inflammatory cytokines in spleen and it induces some alterations of cytokine synthesis that may arise some questions concerning the safety of the Commission recommendation for the maximum admitted level for pig feeding stuff.

Keywords: ochratoxins, weanling pigs, spleen, inflammation

The effect of processing feed-grade wheat on the post-prandial evolution of rumen pH, in the context of an acidogenic diet

Smaranda Toma, Ana Cismileanu, C. Dragomir
National Research Development Institute for Animal Biology and Nutrition (INCDBNA), Balotesti, Romania

The objective of the work was to estimate the cumulated effect of several acidogenic factors on the dynamics of the rumen pH. Thus, in the context of an acidogenic diet (with high concentrates: forages ratio, high proportion of cereals in the compound feed and high ruminal degradability of the starch), three different processing techniques of the feed-grade wheat (the main constituent of the compound feed) were compared: finely, intermediary and coarsely ground (F, I and C group, respectively). The three experimental compound feeds were tested on three fistulated rams, organised in a 3x3 Latin square. All three experimental compound feeds led to a quick decrease of the curves that graphically describe the post-prandial evolution of the rumen pH: at 8 hours after the morning meal, the pH values were close to 5.5 (also for the C group). Despite this decrease, the supplementary acidogenic factor (finer grinding) let to supplementary decreases of the pH level.

The differences are small when average pH is taken into account (6.13 - F group, 6.27 – I group, 6.38 – C group) but noticeable when the synthetic parameters of the pH evolution are taken into account. Thus, the length of duration of pH decrease below 6.0 was 5.03, 4.06 and 2.92 hours, respectively whereas intensity of pH decrease was 1.32, 0.86 and 0.70 hours x pH units, respectively. The results showed that fine grinding of the concentrate feeds had acidogenic potential even in the context of an already acidogenic diet and that the effects of the involved acidogenic factors are additive.

Keywords: wheat, processing, rumen pH

Dried distiller's sorghum with solubles as a potential component of diet for dairy cows

Barbara Król[1], Joanna Chmielewska[2], Małgorzata Serowik[3], J. Sowiński[4], Maja Słupczyńska[1]

1 Department of Animal Nutrition and Feed Science, 2 Department of Food Storage and Technology; 3 Institute of Agricultural Engineering; 4 Department of Crop Production, Wrocław University of Environmental and Life Sciences, Wrocław, Poland

The risk of depletion of conventional energy resources and the threat of natural environment pollution during their burning, forcing to raise biofuels production from various biomasses. Recently, a lot of attention has been paid to one of by-products of bioethanol production from European renewable energy sources. The chemical composition of sorghum qualifies sorghum as a potential source of bioethanol but it also creates the necessity management of by-products of bioethanol production. The aim of the study was to determine potential feed value of dried distiller's sorghum with solubles (DDSS) and possibilities of inclusion to livestock diets.

Experimental material consisted of four dried distillers sorghum with solubles (DDSS) – by products of sorghum fermentation for bioethanol purposes. Two types of sorghum fermentation – base and acid were applied in bioethanol production. Additionally by-products of fermentation were dried using two different methods. In DDSS samples the proximate feed analysis were carried out – dry matter, crude ash, crude protein, crude fibre, crude fat and nitrogen free extractives according to standard methods (AOAC, 2005). Moreover fibre fraction NDF, ADF and ADL were determined. Minerals content were determined in DDSS samples after wet mineralization with nitric acid (HNO3) using MarsX apparatus by atomic absorption spectrophotometry using an AA 240 FS apparatus with SIPS 20. Phosphorus content in DDSS was analyzed according to the ammonium vanadomolybdate method using a Specol 11 spectrophotometer. The amino acids profile was determined using an Analysator AAA 400 Ingos. The type of fermentation and drying method clearly affect chemical compositions of DDSS. The high NDF content in all samples is a factor that limit or even preclusive these by-products inclusion in monogastric diets. Taking into consideration chemical composition of DDSS there is a possibility to introduce DDSS to ruminant diets but to determine actual feed value of these by-products animal research are needed.

Keywords: sorghum, bioethanol, fermentation, drying, by-product, chemical composition

Rumen degradability of dry matter and crude protein of various forms of dried distillers grains with solubles

Maja Słupczyńska[1], Barbara Król[1], A. Zachwieja[2], J. Sowiński[3], Martyna Mońka[1], Eva Petraskova[4], B. Čermak[4], R. Bodarski[1]

1 Department of Animal Nutrition and Feed Science; 2 Institute of Animal Breeding, Department of Cattle Breeding and Milk Production; 3 Department of Crop Production, Wrocław University of Environmental and Life Sciences, Wrocław, Poland; 4 Department of Genetics, Animal Breeding and Nutrition, České Budějovice, University of South Bohemia, Czech Republic

Recently EU policy has been expressing concern about renewable energy sources. There is a considerable need for ongoing research on various kind of biomasses as potential energy resources and by-products of biofuels production as DDGS. Increasing interest in utilization of such by-products in animal diet leads to the need of determination of their feed vales and possibilities of their inclusion in livestock nutrition. The aim of the study was to compare rumen degradability of dry matter and crude protein of various forms and kinds of DDGS. The research material consisted of three various DDGS, each in two forms: I – corn loose, II – corn pelleted, III – wheat-corn loose, IV – wheat-corn pelleted, V – barley-corn loose and VI – barley-corn pelleted. The experiment was carried out on 3 multiparous non-lactating dairy cows fitted with a rumen cannula. They were kept in tie-stalls and fed a standardized diet at maintenance, consisting of 4 kg meadow hay and 1.8 kg concentrate mixture per day. The ration was given to animals twice a day at 06:00 and 16:00 h. The *in situ* procedures applied to measure rumen degradability of dry matter (DM) and crude protein (CP) were carried out according to standard methodology for such type of experiments. Rumen degradation characteristics of various dried distiller's grains with solubles demonstrated that both form and raw-material used in bioethanol production affected rumen degradability of dry matter and crude protein. ERD of dry matter of loose corn and barley-corn DDGS was 43.08% and 41.40% respectively and clearly higher than their loose forms – 36.60 and 37.42%. Slight, but significantly ($P \leq 0.05$) higher effective rumen degradability of crude protein wheat-corn DDGS compared to corn and barley-corn ones. ERD of crude protein of corn DDGS was 12 % higher compared to its loose equivalent.

Keywords: DDGS, rumen effective degradability, dry matter, crude protein

Rational livestock nutrition in rural areas – Erasmus+ project addressed to all involving in animal production

Wrocław University of Environmental and Life Sciences, Poland; National Research Development Institute for Animal Biology and Nutrition (INCDBNA), Balotesti, Romania

Livestock breeders of EU new member countries in Eastern Europe have confronted with animal and product losses because of the absence of a rational livestock nutrition methods in rural areas. Besides this, they pay high economic costs. This means spending significant amounts in expenditures, decreasing in profitability and increasing in immigration of young people living in rural areas to the big cities. Rational Livestock Nutrition in Rural Areas is the project funded by Erasmus+ KA2 for Vocational Education and Training intends to develop a curriculum for livestock breeders trainers, especially in rural areas and transfer of new methods of livestock nutrition to the East European farmers to improve their knowledge and to make them familiar with the best methods of feed production, animal diet formulation according to modern feeding systems with respect to financial and physiological aspects as well as modern and environment friendly methods of production. The main objective of the project is to create completely updated teaching materials on livestock nutrition for rural areas and relevant importance as indicators of agriculture sustainability. LiveNutrtion project is developing by international consortium from Poland, Romania, Hungary, Turkey and Italy and consists of experienced partners representing different profiles among them universities, research institutes and associations.

Determination of the hydroxymethylfurfural by two liquid-chromatographic methods: HPLC and OPLC densitometry

Mihaela Vlassa, Maria Feneșan, Ana Balea, Irina Ciotlăuș, Miuța Filip
Babes-Bolyai University, Raluca Ripan Institute for research in Chemistry, Cluj-Napoca, Romania

Hydroxymethylfurfural (HMF), furan derivative is a water-soluble heterocyclic organic compound derived from sugars, and has both aldehyde and alcohol functional groups, formed during extended food storage under acidic conditions. It is an indicator of excessive heat-treatment, spoilage and of possible adulteration of honey with other sugars or syrups.

A new OPLC (over pressure liquid chromatography) method for HMF determination from honey was developed. The OPLC chromatograms were collected on OPLC silica gel layer Normal F_{254} plates, using Personal PLC 50 Chromatograph (Budapest), elution with ACN

100%, and visualisation at 280 nm, registered by the Desaga densitometer CD-60 with the ProQuant software. Samples and HMF standards were applied by HPTLC Desaga applicator AS 30.

The HPLC (high performance liquid chromatography) chromatograms of honey samples were performed using an Agilent 1200 Series liquid chromatograph with Diode Array detection. The HMF was separated on an Agilent Zorbax Eclipse XDB C18 column (5 μm, 150 $\times$ 4.6 mm) with CH_3OH: H_2O, (50:50, v/v) as mobile phase, using flow a rate of 1 ml/min and detection at 284 nm. The chromatograms and calibration curves were registered and processed with ChemStation soft. Both methods were validated by establishing the calibrating curves, detection and quantification limits, and recovery degree.

The verification of the results of HMF, quantification in honey obtained by the new OPLC method was successfully demonstrated by comparison with the HPLC method.

Keywords: hydroxymethylfurfural, HPLC, OPLC