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## CANONICAL CORRELATION ANALYSIS FOR ESTIMATION OF ECONOMIC TRAITS AT WEANING IN INDIGENOUS PIG

**Ogah D. M.**

Animal Science Dept College of Agriculture  
pmb 33 lafia Nasarawa State, Nigeria  
e-mail: mosesdogah@yahoo.com

A canonical correlation analysis was used to examine the relationship between some traits at birth and at weaning in indigenous pigs, the traits measured, include live weight (lwt), body length (bdl), rump height (rh) and hearth girth (hg) were obtained from fifty two piglets at birth and at weaning at eight weeks period. The traits measured at birth period were one set of measurement ( $X$  – variable) and the same traits measured at weaning period were the second set of measurement ( $Y$  – variables). Four canonical correlation were obtained (0.988, 0.973, 0.591 and 0.284). Among the estimated coefficient only the first canonical variable was significant ( $p < 0.05$ ). Live weight and body length at birth had a positive effect on the live weight at weaning. These two traits can be used as early selection criteria for determining piglet weaning weight.

**Keywords:** Canonical correlation, body measurements, pig and factor loading.


## BIOTECHNOLOGIES USED TO OBTAIN PROBIOTIC BIOMASS IN BATCH SYSTEM

**Emanuel Vamanu**

University of Agronomic Sciences and Veterinary Medicine,  
Faculty of Biotechnology,  
Bd. Mărăști no. 59, sector 1, Bucharest, Romania  
e-mail: emanuelvamanu@yahoo.com

The study aims at obtaining lyophilized biomass of *Lactobacillus fermentum* BS2 and *Bifidobacterium bifidum* BS4 and BS5 strains. The optimal medium was chosen by using Bioscreen C MBR and EZExperiment software, based on the productivity of strains compared to that obtained in MRS medium. Maximum growth rate, doubling time and cell productivity were calculated for each of the three strains. By using 2% glucose, 0.5% peptone and 0.5% yeast extract, a 68% higher productivity on average resulted in culture medium, in batch cultivation system.

**Keywords:** Bifidobacterium, batch, productivity, Bioscreen C.



**DETERMINATION OF SOME NORMAL SERUM PARAMETERS  
IN JUVENILE STAGES THE SEVRUGA STURGEON ACIPENSER STELLATUS  
(PALLAS, 1771)**

**Tanți Patriche<sup>1</sup>, Neculai Patriche<sup>2</sup>, Elena Bocioc<sup>3</sup>**

<sup>1</sup>University „Dunărea de Jos” of Galați, Faculty of Medicine and Pharmacy,  
35, Al. I. Cuza St., 800010, Galați, Romania,  
e-mail: tanti.patriche@yahoo.com

<sup>2</sup>Institute for Research and Development in Aquatic Ecology,  
Fishing and Aquaculture, 2-4 Portului St., 800032, Galați, Romania, phone: 0040 236  
416914, fax: 0040 236 414270

<sup>3</sup>University „Dunărea de Jos” of Galați,, Department of Aquaculture,  
Environment Science and Cadastre, 61-63, Gării St., 800003, Galați, Romania  
e-mail: elenabocioc@yahoo.com

To be aware of the health condition of the biological material in a fish farm allows us to establish the preventive measures required to prevent spreading of a disease and the treatment to be applied in case that a mass disease occurs. That is why to know the normal value of the serical glycemia, the total protein and the protein fractions in serum enables us to differentiate the normal physiological condition of the fish material under research from the eventual pathological modifications having occurred due to the defence reaction of the organism. The level of the serical glycemia representing a high value marker indicator of the stress condition, while the level of total protein in serum is, first of all, a synthetical indicator of the nutritional condition of the organism. The most part of diseases have but a little influence on the concentration of the total protein in the blood, but some influence on certain protein fractions, and they alter the ratio between albumins and globulins. A decrease below 0.3 in value of the ratio albumins/globulins in serum is significant for the health condition of fish.

**Keywords:** sevruga, glycemia, total protein, albumin, disease.

## FERTILIZATION OF BOAR SEMEN IN TERMS OF AREA DILUTION AND DURATION FOR RETENTION


Elena Marandici<sup>1</sup>, G. Darie<sup>1</sup>, V. Harea<sup>2</sup>

<sup>1</sup>Institute of Scientific and Practical Animal Husbandry  
and Veterinary Medicine in Biotechnology

<sup>2</sup>State Enterprise for Research on selection and hybridization pigs "Moldsuinhibrid"  
e-mail: darie@mail.ru

The objective of this study was to examine the effects of duration of storage of diluted boar semen fertilization rate in sows. The experience was used thinner "Atropozit and M22 for dilution and storage of semen for a period of 2-3 days from 3-4 days to 4-5 days and the 5-6 day. Witness was on semen collection. Duration of sperm storage was identical for both environments (+16-180 C). The fertility rate did not differ between extenders while preserving sperm diluted in 2-3 days. Diluted sperm storage duration of 4-5 days and 5-6 days at different rates depending on the solvent used fertility. Sows inseminated with semen diluted and stored at 16-180C with thinner "Atropozit" 5 to 6 days had a fecundity of 70% and sows inseminated with sperm stored in diluent M22 – by 68.7%. The results of this study indicate that during the storage of boar semen at 16-180C temperature influence sperm fertilized power.

**Keywords:** boar, semen, dilution medium, artificial insemination.



## **INVESTIGATING ON THE EFFECTS OF PHOSPHATE SOLUBLIZING BACTERIA ISOLATED FROM SOIL MICROFLORA ON CARCASS CHARACTERIZES, SERUM PHOSPHATE, ALKALINE PHOSPHATASE AND PERFORMANCE IN BROILER**

**Mehdi Ghaderi Jouybari<sup>1</sup>, Mohammad Ali Malboobi<sup>2</sup>  
Mehرداد Irani<sup>3</sup>, Shahabodin Gharahveysi<sup>3</sup>, Shayan Rahimian<sup>3</sup>,  
Sayyed Alireza Siadati<sup>3</sup>**

<sup>1</sup>Young Researchers Club Member, Islamic Azad University Ghaemshahr.  
Branch-Iran

<sup>2</sup>Department of Biotechnology, National Institute of Gene Engineering  
and Biotechnology, Tehran-Iran

<sup>3</sup>Faculty of Agriculture, Animal Science Department,  
Islamic Azad University Ghaemshahr Branch-Iran  
e-mail: ghaderi689@yahoo.com

Probiotics are feed additives composed of live microorganisms and affect host digestive system microbial balance. In this experiment, effects of two phosphate solublizing bacteria (PSB) isolated from soil microflora of different area of iran as novel probiotic on serum concentrations of phosphate, alkaline phosphatase, carcass characterizes and performance factors were investigated. The experiment included 320 Ross broilers from 1 to 49 days of age. Birds were randomly allocated to 4 treatments, with 4 replicates of 20 birds. Treatments include T1.Negative Control (basal diet, with no added probiotic); T2 – Negative Control + Probiotic (in starter, grower and finisher); T3 – Negative Control + Probiotic (in grower and finisher) and T4 – Negative Control + Probiotic(in finisher). The results obtained in this experiment showed that the probiotic significantly increased body weight gain( $P<0.05$ ).

Probiotic significantly improved feed conversion ratio ( $P < 0.05$ ). The best feed conversion ratio observed in T2 than other groups. However, the probiotic supplementation did not affect on feed intake, breast and legs weight between treatments ( $P < 0.05$ ). In addition, results showed that probiotic caused significantly increased serum phosphate and carcass yield but caused significantly decreased serum alkaline phosphatase ( $P < 0.05$ ). Mean phosphate was significantly higher in the T2 fed group ( $P < 0.05$ ) when compared to treatment without probiotic. These results suggested that these bacteria can use in broiler diet as probiotic to improve broiler performance. However, this needs more experiences.

**Keywords:** Probiotic, Phosphate solublizing bacteria, Alkaline phosphatase, broiler.



## WHOLE BARLEY-DILUTED DIETS IN BROILERS AND ITS ECONOMY

**Ergun Demir**

Balıkesir University, Institute of Health Sciences, 10145, Balıkesir, Turkey  
e-mail: [ergun@balikesir.edu.tr](mailto:ergun@balikesir.edu.tr)

A study was conducted to determine the effect of semi-choice or free-choice feeding using whole barley supplemented diets in broiler chickens. Broiler chicks were divided into four experimental groups at 19 days of age. The control birds fed a standard grower diet in mash form. Two experimental groups were fed by standard mash grower diet with whole barley from 19 to 42 days using a learning period (semi-choice I) or directly from 24 to 42 days of age (semi-choice II). The last group was fed separately both of the grower diet and whole barley within two different feeders in the same floor pen (free-choice). The treatments didn't affect on body weight gains ( $P>0.05$ ). Free-choice-fed birds consumed more feed and selected more whole barley than other groups ( $P<0.05$ ). Gain: feed was lower in free-choice-fed broilers compared to the control ( $P<0.05$ ). Broilers fed whole barley which mixed with grower diet or free-choice basis selected less energy and protein in their diets than those fed the control diet ( $P<0.05$ ). Broilers fed free-choice basis deposited more abdominal fat than the control broilers. Gizzard sizes were decreased by feeding whole barley. The feed costs per kg of body weight gain were decreased 5.62 % by feeding whole barley on free-choice basis compared to the control. It was tended to decrease by feeding whole barley in all broilers given whole barley.

**Keywords:** broilers, whole barley, free-choice, semi-choice, costs.

**CONTROL ON THE WHEAT NON-STARCH POLYSACCHARIDES  
(NSP)' ANTI-NUTRITIONAL EFFECT ON INTESTINAL WALL,  
BY INTRODUCING XYLANASE IN BROILER FEED**

**Ștef Lavinia, Dumitrescu Gabi, Julean Calin,  
Drinceanu Dan, Ștef Ducu., Pandur Cosmin**

Banat's University of Agricultural Sciences and Veterinary Medicine,  
Calea Aradului, 119, 300645 Timișoara, România  
e-mail: lavi\_stef@yahoo.com

The experiment was performed in order to determine the protocol of xylanase utilization to fight against the anti-nutritional effect exerted by wheat non-starch polysaccharides (NSP) on intestinal wall in broilers. The experimental works were carried out on broilers, the hybrid Ross 308. We formed four experimental groups, as follows: the experimental group LE1, fed on forage without wheat in its structure, the experimental group LE2, fed on combined forage including wheat in a proportion of 40%, the experimental group LE3 including wheat in a proportion of 40% and xylanase, in an amount of 25 g/to, and the experimental group LE4, including wheat in a proportion of 40% and xylanase, in an amount of 100 g. At 3 and 6 weeks, successive to chicken killing, we sampled the intestinal wall and determined the main changes occurred. The histo-morpho-metric analysis of the four experimental groups led to the conclusions that: wheat administration in a proportion of 40% in the individuals in LE2 determines the development of vilositary muscle elements (Bruke muscle), leucocitary migration, and also vascular ectasies and reduced hemorrhagic areas.



The addition of xylanase addition in the wheat-based feed may be associated with the increase of intestinal villous height, and especially at jejuna level the villous seem slightly branched, a slight hypertrophy of the epithelial cells compared with the individuals in LE2, the increase of caliciform cell frequency and hypertrophy of the capillary network. These microscopic aspects come together with more intense digestion and absorption processes, and especially in the experimental group 4.

**Keywords:** xylanase, non-starch polysaccharides (NSP), intestinal wall, broiler, histo-morphometry.

## ENZYME EFFECT ON INTESTINAL VISCOSITY IN BROILERS FED WHEAT AND BARLEY BASED COMPOUND FEED

Stef Lavinia, Julean Calin, Drinceanu Dan, Simiz Eliza,  
Căprită Rodica, Stef Ducu Sandu, Pandur C

Banat's University of Agricultural Sciences and Veterinary Medicine,  
Calea Aradului, 119, 300645 Timișoara, România  
e-mail: lavi\_stef@yahoo.com

The objective of this experiment was to determine the protocol of enzymatic products utilization according to the wheat and barley proportion in the compound feed used in broilers. We used this experiment to analyze the anti-nutritional NSP's effect of the wheat introduced in the compound feed in a proportion of 60% and also of the compound feed including wheat in a proportion of 30% and barley in a proportion of 30%, on the digestive indices in broilers. To these, we added the variants with introduction of xylanase, in an amount of 100 ppm, and to counteract the anti-nutritional effect of the wheat and barley-based NSP, we introduced 50 ppm xylanase and 50 ppm beta glucanase. We also determined the coefficients of correlation between the digestive coefficient values (intestinal viscosity) and the soluble, insoluble and total NSP contents. The introduction of the wheat-specific enzyme in combined forage in a proportion of 60% (LE3) or 30% wheat and 30% barley (LE5) determine viscosity reduction at duodenum and jejunum levels. The biggest correlation coefficient, at the age of 3 weeks at duodenum level, was recorded between viscosity and the NSPs content (0.762) and at jejunum level between viscosity and the NSPt content; at 6 weeks, the biggest coefficient at duodenum level was recorded between the NSPt content (0.987) and viscosity, and this was available in the case of jejunum, too (0.977).

**Keywords:** enzymatic products, wheat and barley proportion, NSP content, intestinal viscosity.



## OXIDATION OF LIPIDS AND PROTEINS IN *M. LONGISSIMUS* DORSI DURING STORAGE AND THERMAL HEATING IN LIMOUSIN CROSSBRED CALVES

**Teodora Popova, Penka Marinova**

Institute of Animal Science, Kostinbrod, Bulgaria  
e-mail: [tlpopova@yahoo.com](mailto:tlpopova@yahoo.com)

The oxidative changes in lipids and proteins in *m. Longissimus dorsi* during storage and thermal heating were studied in pasture reared and indoor finished Brown x Limousin and Black and White x Limousin calves. Lipid oxidation was measured by determination of the amount of malondialdehyde accumulated after 24 h, 48 h, 4<sup>th</sup> and 6<sup>th</sup> day at 4°C and after 100<sup>th</sup> day at -20°C. In proteins the oxidative changes were examined after determination of carbonyls formed during thermal heating with different duration. The time of storage influenced significantly ( $P<0.001$ ) the oxidation in *m. Longissimus dorsi* of the calves from both crossbreeds, reared on pasture or indoor finished, since in the course of storage the amounts of malondialdehyde were increased. Significant influence of the rearing strategy on the lipid oxidation was observed in Brown x Limousin calves ( $P<0.001$ ) as the quantity of malondialdehyde remained lower for the pasture reared animals. Thermal heating induced intensive oxidative processes in proteins in the two crossbreeds and in its course the content of carbonyl substances in *m. Longissimus dorsi* increased significantly ( $P<0.001$ ).

**Keywords:** oxidation, lipids, proteins, storage, thermal heating.


## EFFECT OF MOISTURE INCREASE DURING CONDITIONING PROCESS ON MICROBIOLOGICAL PROPERTIES OF PELLETS

I. Čabarkapa, R. Čolović, Đ. Vukmirović, B. Kokić,  
D. Ivanov, Lj. Šarić, J. Lević

University of Novi Sad, Institute for Food Technology,  
Novi Sad, Serbia  
e-mail: ivana.cabarkapa@fins.uns.ac.rs

The main preoccupation of feed industry nowadays is the production of safe and hygienic correct animal feed. It is conditioned by the quality of raw materials, applied technological procedures and stability of the product in the storage conditions. Thermal processing (pelleting, extrusion, expansion, etc.) is one of the most efficient manners for reducing presence of the microorganisms in feed. Complete mixture for pigs II was conditioned up to moisture content of 15.97 %, 19.40 %, and 21.88 %. Conditioned material was pelleted on flat die pellet press, and pellets were stored. To evaluate microbiological quality and safety of compound feed for pigs, samples were analyzed before processing, after conditioning, after pelleting and during storage period (24 hours and 15 days, respectively). Microbiological safety of analyzed products was evaluated in accordance with the regulations of Serbia. Experimental results have shown significant ( $p < 0.05$ ) reduction of total count of bacteria (from 350.000-400.000/g to 100-4000/g) and moulds (from 20.000-25.000/g to 0-800/g) during conditioning and pelleting process. During 24 hour storage of pellets, increase of microbiological growth occurred in material conditioned to highest moisture content. Coagulase positive staphylococci, *E. coli*, *Salmonella* and *Proteus* species were not detected in analyzed samples. Sulphyte reducing Clostridia were detected in all samples, but their number was below the limits prescribed by the Regulation, ranging from 100-200/g. Amount of water added during conditioning has determinate temperature profile during pelleting and moisture content of pellets during storage, parameters which are highly influencing microbiological growth.

**Keywords:** pelleting process, conditioning process, moisture content, microbiological quality



## EFFECT OF SEX RATIO WITH MALE PERMANENT OR INTERIM ATTENDANCE IN SPANISH AND WHITE JAPANESE QUAIL FOR ESTIMATION OF FERTILITY RATE

**Shayan Rahimian<sup>1</sup>, Ahmad Zareh Shahneh<sup>2</sup>, Mehrdad Irani<sup>3</sup>, Zarbakht Ansari<sup>4</sup>, Alireza Siadati<sup>5</sup>, Mehdi Ghaderi Jouybari<sup>6</sup>**

<sup>1</sup>MSci, graduated of Animal Physiology, Islamic Azad University, Ghaemshahr Branch, Ghaemshahr, Iran

<sup>2</sup>Animal Science Department, the University of Tehran, Karaj, Iran

<sup>3</sup>Animal Science Department, the University of Ghaemshahr Islamic Azad University, Iran

<sup>4</sup>Department of Animal Science, Sari Agricultural Science & Nutritional Resource University, Sari, Iran

<sup>5</sup>MSci, graduated of Animal Nutrition, Islamic Azad University, Ghaemshahr Branch, Ghaemshahr, Iran

<sup>6</sup>Young researchers club member, Islamic Azad University, Ghaemshahr Branch, Ghaemshahr, Iran  
e-mail: rahimianshayan@yahoo.co.in

How many males are sufficient for good fertility in cage? Although, males birds causes aggressive pecking in cages. Experimental material consisted of 540 adult Japanese quails. Birds were in the same age (6 weeks). Before start of experiment, birds kept in separate sex cages for 14 days. In every period (8 days) we selected 144 hens and 36 cocks randomly then placed them in 36 units (twelve treatments and three replicates). The experiment was factorial (3\*2\*2) and used from completely randomized design. Meanwhile the experimental factors contains: 1. sex ratios 1m : 2f, 1m : 4f and 1m : 6f; 2. Spanish and white Japanese quail, and 3. interim or permanent attendance of cocks in cages.

In the start of every period we randomly selected quails and arranged them, after three days, males were omitted from interim units and after that, eggs were collected several times a day, so stored in egg room for 7 days. Eggs were put in standard incubator. Data were analyzed using the GLM procedure of SAS. The ratio of 1m : 2f had the highest fertility ( $p < 0.05$ ) compared with other treatments. Ratio of 1m : 4f had high fertility, but there was no significant difference between 1 : 2 and 1 : 4 ratios. Fertility of two strains with ratio of 1m : 4f in interim was significantly higher than permanent treatments. Spanish strain significantly had higher fertility in all treatments. Result of this experiment demonstrated that after successfully mating, when cocks were not in cages during laying, fertility was high.

**Keywords:** fertility rate, sex ratio, Spanish Japanese quail, white Japanese quail



## VITAMIN E ENRICHMENT OF EGG YOLK USING DIFFERENT LEVEL OF VITAMIN E AND SELENIUM IN FEED MIXTURES

**Filev Kiril<sup>1</sup>, Natasha Gjorgovska<sup>2</sup>, Biljana Chuleva<sup>3</sup>**

<sup>1</sup> Faculty of Agricultural Sciences and Food, Skopje, Macedonia  
e-mail: filevkiril@yahoo.com

<sup>2</sup> Institute of Animal Science, Skopje, Macedonia,  
e-mail: ngjorgovska@yahoo.com

<sup>3</sup> Republic Institute for Health Protection, Skopje, Macedonia,  
e-mail: bculeva@hotmail.com

The common trend for enriched egg production with vitamin and minerals, the most important place take vitamin E and selenium. Enriched eggs with this vitamin and selenium is expected to initiate the positive effects on the antioxidative capacity of egg yolk because they are antioxidants. The laying hens were treated with feed mixtures in which the vitamin E content was: – 30; 100 and 230 mg/kg feed, and selenium content vary between: – 0.3; 0.38 and 0.46 mg/kg feed. For this purpose the basic feed with 30 mg of vitamin E kg and 0.3 mg selenium/kg was used for control group of hen's nutrition. The hens from the experimental groups were feed with higher content of vitamin E in two combinations: 1. – 100 mg vitamin E/kg feed and selenium content of 0.3, 0.38 and 0.46 mg/kg and 2. – 230 mg vitamin E/kg feed and selenium content of 0.3, 0.38 and 0.46 mg/kg. Vitamin E content in the yolk was lesser in control group in average 1.62 mg/one yolk, in yolk of experimental hens treated with 100 mg vitamin E in kg feed it was 2.90 mg and in yolk from hens treated with 230mg/kg feed, 5.58mg. The content of this vitamin in hen's feed has trend of increasing the laying intensity, similar as a content of higher amount of selenium.

**Keywords:** eggs, enriched, vitamin E, selenium.

## NATURAL FEED CONCENTRATES AIMED TO REPLACE CHEMICAL SYNTHESIS BASED CONCENTRATES

Tamaş Viorica<sup>1</sup>, Belală Daniela<sup>1</sup>, Ionescu Florian<sup>1</sup>, Criste Rodica<sup>2</sup>,  
Hebeanu Veronica<sup>2</sup>

<sup>1</sup>S.C. Hofigal Export-Import S.A.,  
Str. Serelor nr. 2, sect.4, Bucureşti

<sup>2</sup>INCDBNA Balotesti  
e-mail: belala\_dana@yahoo.com

This paper presents studies carried out to obtain exclusively natural complex feed concentrates, rich in minerals and other nutrients that stimulate the growth of young animals. They ensure better absorption of nutritional compounds, due to their biocompatibility, unlike the poor absorption of chemical synthesis nutrients. Products are made in the form of powder and/or pellets, depending on administration option. These concentrates were made by the association in some reports and some technical conditions of industrial products, resulting from non-chemically treated plant material, representing the press cakes from legumes, fruit and leaves of plants rich in minerals, protein and other phytochemical compounds, interesting for a healthy animal nutrition. Feed concentrates based on scientific studies have an important positive effect on growth of young animals and the quality of livestock products (meat, milk, eggs, etc.) with consequent benefits for the state of human health and environmental impact.

**Keywords:** natural complex feed concentrates, minerals, growth, young animals.



## MOLECULAR ANALYSIS OF ROMANIAN SALMONID SPECIES BASED ON 16S RRNA AND 12S RRNA SEQUENCES

**Andreea Dudu, Oana Popa, Sergiu-Emil Georgescu,  
Anca Dinischiotu, Marieta Costache**

University of Bucharest, Molecular Biology Center, Bucharest  
e-mail: tn\_andreea@yahoo.com

The present study represents a preliminary analysis of the 16S rRNA and 12S rRNA mitochondrial sequences in five salmonid species adapted in Romania: *Salmo trutta fario*, *Salmo labrax*, *Salvelinus fontinalis*, *Onchorhynchus mykiss* and *Thymallus thymallus*. A PCR amplification of a region from the mitochondrial genes mentioned above was performed, followed by the direct sequencing and the analysis of the nucleotide variation. The partial sequences of the 16S rRNA and 12S rRNA genes were aligned and compared with similar sequences from GenBank in order to identify the potential polymorphisms and to evaluate the suitability of these molecular markers for salmonid population genetics and phylogenetic studies.

**Keywords:** salmonids, mitochondrial DNA, rRNA, polymorphism.

## EFFECT OF MINERAL SUPPLEMENTS ON BIOPRODUCTIVE PERFORMANCES ON AVIAN YOUTH IN ORGANIC SYSTEM

**Călin Julean, Eliza Simiz, Dan Drinceanu,  
Lavinia Ștef, Ioan Luca, Domnica Sofian**

Banat's University of Agricultural Sciences and Veterinary Medicine Timișoara,  
Calea Aradului, No.119, 300645, Romania  
e-mail: calinjulean@animalsci-tm.ro

The experiment on the mineral supplementation of the feed used for mixed breed avian youth was performed in concordance with the European Union legislation and applied the feeding and maintenance conditions specific to the organic system. According to the experimental organization scheme, an initial number of 150 chickens was randomly distributed in three experimental groups; in feed, we added a macroelement-based mineral premix, in a proportion of 3%, in G1, with sources of macro- and microelements, namely 20 ppm Fe, 40 ppm Mn, 40 ppm Zn, 3 ppm Cu, 0.25 ppm Co, 0.4 ppm I and 0.2 ppm Se in G2 and half of these doses in G3. By supplementing the feed for avian youth bred under organic system, with a mineral premix based on accepted mineral sources, in amounts that are adequate for slow growth, we observed an increase of the concentrated mixture ingestion with 6.11%, the body weight was significantly ( $p < 0.05$ ), influenced with 11.8% and the weight gain with 12.15%, while the conversion index decreased with 5.4% compared with the group fed without addition of microelements. Feed supplementation with half of the doses above (G2) provides a bigger ingestion, with 3.26%, a body weight that was not significantly ( $p > 0.05$ ), bigger with 7.3%, respectively a bigger gain with 7.4% and a conversion index that was 2.7%-fold smaller than in the reference group, whose feed was not supplemented.

**Keywords:** mineral, avian youth, organic system, poultry nutrition.



## POSSIBILITIES TO SUBSTITUTE THE SELECTION ON INDEPENDENT LEVELS WITH INDIRECT SELECTION

Gheorghe Sandu

Selection on multiple traits diminishes the genetic progress on the generation for each one. In addition, adding some traits known later in the candidates' life increases the generation interval and participates at the greater diminution of yearly genetic progress. It is expected that in accordance with the correlation between characters to be a limit beyond which it is bigger the correlated effect of an indirect selections on an earlier character that would reduce the generation interval. In this study the author establishes mathematical relationships that allow mathematical modelling of the problem investigated. The results show that if we have two characters and it is possible to obtain the value 2 for the parameter  $k$  (simplifying the objective to a single character would bring in indirect selection of the second, or the doubling of the heritability or the halving of the interval of the generation) it is possible to renounce at the selection of the both characters on independent levels when the correlation between them is greater than 0,4. With  $k = 4$  (indirect selection on a character with double heritability and generation interval halved) critical value of the correlation decreases to 0,2, and with a correlation of 0,5 indirect selection offers a double effect unlike the independent levels. When  $n > 2$ , it is recommended simplifying the objective of the selection from 3 to 2 characters when  $k = 2$  and the multiple correlation is greater than 0,35. With  $k = 2$ , the transition from 4 to 3 characters is recommended even with a correlation of 0.3.

**Keywords:** selection, multiple traits, mathematical modelling, interval generation, genetic progress.


## METHOD TO INCREASE COMPOUND FEED EFFICIENCY

**S. Kononenco**

North-Caucasus Research Institute of Animal Husbandry,  
str. Pervomaiscaia 4, 350055, w. Znamenskii, Krasnodar, Russia  
e-mail: caisinlarisa@mail.ru

The positive effect of the fermentative preparation Ronozim WX used at the rate of 250mg/tonn of compound feed, containing 40-50% of triticale grain, on the efficiency of young pigs, digestibility of main nutrients and hematological indices was determined in a scientific and economic experiment.

**Key words:** young pigs, fermentative preparation, Ronozim WX, compound feed, triticale grain.



## THE INFLUENCE OF SOME ABSORBENT MATERIALS USE UPON MICRO-CLIMATE AND ZOOTECHNICAL PARAMETERS IN BROILERS

D. Drăgotoiu<sup>1</sup>, Carmen Albulescu<sup>2</sup>, M. Ioniță<sup>2</sup>,  
Monica Marin<sup>1</sup>, Elena Pogurschi<sup>1</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine, Bucharest

<sup>2</sup>AMD - Initiative

During the effected research, it was aimed the establishment of the volcanic tufa influence use in different proportions upon litter composition in poultry houses and upon structure of the compound meals fed to broilers, upon the air composition in the house, upon litter quality, upon zootechnical parameters of broilers (weight growth gain, specific consumption, mortality) as well as upon carcass quality. By using mineral absorbing supplement, there were obtained significant decreases of ammonia in the house air. It was obtained an improvement of the litter quality in the houses, lowering the pH value, the content in water and phosphorous and rising the proportion of total azote. Zootechnical performances recorded by chickens were materialized in the decrease of mortality with 16% in the experimental stock, where it was used the volcanic tufa in the compound meal, as well as an increase of the final weight with 1% and a decrease of the specific consumption with 1%. The content in water and lipids of the analyzed chicken carcass decrease in the experimental stock, recording an insignificant increase of the content in proteins and raw ash, the main advantantage of using the adsorbing material in the litter being the external aspect of the chicken chest.

**Keywords:** broiler, volcanic tufa, microclimate, zootechnical parameters, carcass.

## THE CORRELATION OF PRODUCTION CHARACTERISTICS WITH THE GENETIC VARIANTS OF THE ENCODING LOCUS OF B-LACTOGLOBULIN IN THREE SHEEP BREEDS FROM ROMANIA

Sergiu Emil Georgescu<sup>1</sup>, Nicoleta Isfan<sup>2</sup>, Steliana Maria Elvira Kevorkian<sup>1</sup>, Mariana Rebedea<sup>1</sup>, Marieta Costache<sup>1</sup>

<sup>1</sup>University of Bucharest, Molecular Biology Center

<sup>2</sup>University of Agricultural Sciences and Veterinary Medicine, Bucharest

The aim of this study is the genetic characterization of the  $\beta$ -lactoglobulin locus in the indigenous sheep breeds Karakul of Botosani, Merino Palace and Palace milk line. For animal breeders, the genetic polymorphism of milk proteins is of great interest because of milk composition and quality and yield parameters. The polymorphism of the  $\beta$ -lactoglobulin locus was analyzed in three breeds using the RFLP technique. In order to perform this analysis, we designated primers to amplify the polymorphic region at the level of the encoding gene for the  $\beta$ -lactoglobulin protein and the fragments amplified were subjected to endonuclease RSA I digestion. The fragments resulting from restriction were analyzed by agarose gel electrophoresis, identifying thus the allele variants present. The results of the study suggest the possibility of a selection process induced in order to improve the production performance for milk. The using of genetic markers in animal selection is a successful strategy for production systems, the result of applying such methods leads to increasing productivity, product quality and of the benefits obtained in the field of livestock farming.

**Keywords:** polymorphism of the  $\beta$ -lactoglobulin locus, indigenous sheep breeds, Romania.



## LIQUID ADDITION TO FEEDING STUFF POWDERS AS AN ASPECT OF FEED QUALITY AND SAFETY

**Alexandra Kirchner,**

IFF Research Institute of Feed Technology, Braunschweig, Germany  
e-mail: a.kirchner@iff-braunschweig.de

Technological properties of feeding stuff powders e.g. miscibility and segregation are influenced by the properties of their components like particle size distribution. Adjusting the particle size distribution of powders is possible within technological limits and under consideration of nutritional aspects only. Adding small amounts of liquids (e.g. oil, molasses) into the main mixer shall avoid segregation of macro and micro components. An experimental study was carried out at the IFF Research Institute of Feed Technology to mark up technological parameters and material properties for optimized discontinuous liquid application regarding feed quality and minimisation of cross-contamination.

**Keywords:** liquid application, mixture homogeneity, mixture stability, segregation.

## THE ROLE OF CILIATES *EUDIPLODINIUM MAGGII* IN CHITIN DIGESTION IN THE RUMEN OF SHEEP

Renata Miltko<sup>1</sup> Grzegorz Belzecki, Elżbieta Kwiatkowska,  
Tadeusz Michalowski,

The Kielanowski Institute of Animal Physiology  
and Nutrition Polish Academy of Sciences.  
Instytutcka 3, 05-110 Jabłonna, Poland

One of the characteristic ruminant animals is their stomach which is composed of four chambers i.e. reticulum, rumen, omasum and abomasum. The largest chamber is the rumen. The digestion and metabolism of carbohydrates in the rumen took place entirely due to microorganisms: bacteria fungi and protozoa. The carbohydrates digested in the rumen originate from two sources. They are supplied either with the feed or synthesized in the rumen. One of the synthesized carbohydrates is chitin. This polysaccharide is one of the components of the cell wall of fungi which contribute to about 8 % of the total mass of the microbiota inhabiting in the rumen. It is well known that fungal zoospores are readily engulfed by protozoa.

However, the involvement of these microorganism in the metabolism of chitin in the rumen is very poor recognized. Thus the aim of our studies was the examination of the influence of ciliates *Eudiplodinium maggii* on the total chitinolytic activity of microorganism inhabiting in the rumen. The studies were performed on three Żelezieńska rams equipped with rumen fistulae. The animals were either free of the natural rumen fauna (control period) or inoculated selectively with *Eudiplodinium maggii* (experimental period). Daily ration of feed composed of 1.5 kg meadow hay and 0.260 kg ground barley. The food was given at 8 a.m. and 8 p.m. in two equal portions.



The sampling of biological material begun after three weeks of the preliminary feeding of sheep. The samples of rumen content were taken at 8 a.m. at noon and at 4 and 8 p.m. while chitinolytic activity and ciliate number were measured. It was found that the mean chitinolytic activity was 2.8 and 3.2 nM of released acetylglucosamine/g DM of rumen fluid of the protozoa free and refunated sheep/h, respectively. The lowest degradation rate of chitin was found just before feeding and the highest – 4 (ciliate free sheep) and 8 h (refaunated sheep) after giving the feed to animals. The number of ciliates varied between 14700 and 21600 individuals/ml rumen fluid The mean density of the ciliate population in the rumen of refaunated sheep was about 17800 protozoa/ml rumen fluid. The highest number of ciliates was found in the samples taken from the rumen just before feeding while the lowest – 4 or 8 h there after.

**Keywords:** rumen digestion, carbohydrates metabolism, ciliates *Eudiplodinium maggii*, chitinolytic activity.

**EFFECTS OF A BOTANICAL MIX  
IN WEANED PIGLETS DIETS (10-30 KG)  
ON BIOPRODUCTIVE PERFORMANCE AND EXCRETA  
OF SOME TRACE ELEMENTS (ZN, FE, MN)**

**Lefter Nicoleta<sup>1</sup>, Untea Arabela<sup>1</sup>, Hebean Veronica<sup>1</sup>,  
Belala Daniela<sup>2</sup>, Tamas Viorica<sup>2</sup>**

<sup>1</sup> National Research and Development Institute for Biology  
and Animal Nutrition (INCDBNA),  
077015 Balotești, Calea București, 1, jud. Ilfov, Balotești, Romania,

<sup>2</sup> SC HOFIGAL EXPORT-IMPORT SA,  
Intr. Serelor, no.2, 042124, Bucharest

The purpose of this study was to decrease the negative effects of trace mineral concentrations (Zn, Fe, Mn) from pig faeces on soil, using a dietary botanical mix in weaned piglets diets (10-30 kg). This mix (produced by SC Hofigal Export-Import SA, Bucharest, Romania) contained Topinambur (*Helianthus tuberosum*) and dry powder of buckthorn (*Hippophae rhamnoides*) leaves. The experimental study was conducted during 26 days using 24 piglets hybrids (Large White x Landrace), initial average weight 11,83 kg, assigned in 3 experimental groups (C, E1, E2). The experimental groups were fed with the same basal diets in which the nutritional parameters follows NRC (1998) recommendations. The experimental diets differed as follows: group C had an inorganic premix (ZOOFORT P<sub>1+2</sub>, produced by IBNA, Balotești, Romania); E1 group had an inorganic premix in which, the trace elements (Zn, Fe, Mn) were reduced by 50% compared with ZOOFORT P<sub>1+2</sub> and the botanical mix was added 3% in the diet; E2 group had the same premix as E1 but the botanical mix was 5% added in the diet.



The results showed that there are not significant differences ( $p \leq 0.05$ ) between experimental groups concerning the average daily gains (C: 0,584 kg/day  $\pm$  0,13; E1: 0,570 kg/day  $\pm$  0,06; E2: 0,536 kg/day  $\pm$  0,11) and the average daily intakes (C: 1,19 kg/day  $\pm$  0,27; E1: 1,19 kg/day  $\pm$  0,25; E2: 1,13 kg/day  $\pm$  0,18). Organs and carcass development was according to the animal age, without any significant differences ( $p \leq 0.05$ ) between groups. Hemato-logical parameters on all three groups were between normal limits according to animal category and species. The faeces analyses showed a decrease of the trace minerals concentrations for experimental groups compared with C group with: 16,53% (E1) and 17,53% (E2) for Fe; 30,26% (E1) and 31,15% (E2) for Mn and 4,24% (E1) and 4,76% (E2) for Zn. These groups (E1, E2) had a reduced trace minerals concentrations in feed compared with C group with: 36,83% (E1) and 34,01% (E2) for Fe; 25,0% (E1) and 20,20% (E2) for Mn and 9,59% (E1) and 9,20% (E2) for Zn .

**Keywords:** piglet, botanical mix, trace elements, performance, excreta.

**A PRELIMINARY ANALYSIS OF TEST DAY DATA  
FOR PRODUCTION TRAITS IN ROMANIA HOLSTEIN  
USING A RANDOM REGRESSION MODEL**

**Raphael Mrode<sup>1</sup> and Horia Grosu<sup>2</sup> and Valise Bacila<sup>3</sup>**

<sup>1</sup>Scottish Agricultural College, Sir Stephen Watson Building,  
Bush Estate Penicuik, UK.  
email : Raphael.Mrode@sac.ac.uk

<sup>2</sup>National Research Institute for Animal Biology and Nutrition, Balotesti,  
Ilfov, Romania,

<sup>3</sup>National Agency for Animal Breeding and Reproduction,  
Ministry of Agriculture, Romania

The preliminary analysis of Romanian Holstein test day yields for milk, fat and protein was undertaken applying a sire random regression model. The data set consisted of 43206 test day records from the first five lactations of 2772 cows sired by about 211 bulls. The fixed effects in the model were fixed lactation curves nested within age and season subclasses, herd-test-date and parity. The random effects of sires and permanent environmental effects were modelled using orthogonal polynomials of order one. The means of test day yields were 15.07, 0.59 and 0.49 kg for milk, fat and protein yields respectively in the first parity. Corresponding standard deviations were 9.7, 0.38 and 0.32 kg. Similar estimates of means and standard deviations were obtained in later parities. The lactation curve observed was similar to a typical Holstein lactation curve but the peak was less pronounced. The estimates of 305-day heritabilities were 0.32, 0.33 and 0.28 for milk, fat and protein yield respectively. Estimates of repeatabilities were very high at about 0.86. However, estimates of daily genetic variances and heritabilities were high at both ends of the lactation but low at mid-lactation.



Genetic correlations between milk yields were high between test dates adjacent to each other but decreased as the days in milk increased between two test dates. However, the genetic correlations were negative between some days in early and late lactation. This could be due to the small size of data used in this study and the lack of male pedigree in the analysis. Further studies should include more data with male pedigree utilised.

**Keywords:** random regression model, genetic parameters, Romanian Holstein, production traits.

## INDIVIDUAL AND COMBINED EFFECTS OF LOW DOSES OF DEOXYNIVALENOL AND FUMONISINS IN PIGLETS

B. Grenier<sup>1,3</sup>, J. Lucioli<sup>2</sup>, G. Pacheco<sup>1,2</sup>, A.M. Cossalter<sup>1</sup>, D. Moll<sup>3</sup>, A.P. Loureiro-Bracarense<sup>2</sup>, G. Schatzmayr<sup>3</sup> & I.P. Oswald<sup>1</sup>

<sup>1</sup>INRA-UR66, Pharmacologie-Toxicologie, Toulouse, France.

<sup>2</sup>Universidade Estadual de Londrina, Lab. Patologia Animal, Londrina, Brazil.

<sup>3</sup>BIOMIN Research Center, Technopark 1, Tulln, Austria.

Mycotoxins are secondary metabolites produced by fungi and considered as an important risk factor for both human and animal health. Deoxynivalenol (**DON**) and Fumonisin (**FB**) are the most frequently encountered mycotoxins produced by *Fusarium* species and they co-occur in animal diet. Therefore, we performed an *in vivo* experiment to compare the effects of subclinical doses of DON and FB, alone or in combination, on the systemic and intestinal responses of piglets.

Twenty four, 5-week-old animals were randomly assigned to four different groups, receiving separate diets for five weeks; a control diet, a diet contaminated with DON (3mg/kg), FB (6mg/kg), or both toxins. At days 4 and 16 of the trial, the animals were subcutaneously immunized with ovalbumin (OVA) to assess their specific immune response. Blood samples were collected weekly to investigate hematology, biochemistry, and immune (total and specific immunoglobulins concentration and lymphocytes proliferation) parameters. In addition, liver, kidney, lung, spleen and several intestinal parts were collected at the end of the trial to carry out histopathological and transcriptomic analysis.



The low doses of mycotoxins used in the experiment did not affect the body weight gain of piglets. Minor effects were observed on hematology and biochemistry values, and effects were only attributed to the mono-contaminated diets. Despite contaminated diets did not elicit important clinical signs, the low doses induced microscopic lesions and altered the immune response. Histological analysis on target organs such as liver, kidney and lung showed mild to moderate lesions. The co-contaminated diet induced greater effects on liver than mono-contaminated diets, as displayed by the lesional score and hepatocytes proliferation. Regarding immunity, modulation was only observed when immune system was activated. Indeed, no effect was observed in the total non-specific response such as total immunoglobulin (Ig) concentration (IgG and IgA) and lymphocytes proliferation upon mitogenic stimulation. By contrast, the low doses used altered the specific response after the OVA immunization. Firstly, upon OVA stimulation, none of lymphocytes from piglets exposed to the three contaminated diets, was able to be stimulated. Then, the cytokines expression in spleen showed that levels of IL-8, IL-1 $\beta$ , IL-6 and to a lesser extent MIP-1 $\beta$ , decreased significantly, especially for the co-contaminated diet. Such cytokines play a key role in the recruitment of antigen-presenting cells, T-cell proliferation and B-cell activation in response to antigenic challenge. As a result of this disruption, concentration of specific anti-OVA IgG was significantly decreased in the plasma of animals fed with both DON and FB. Our observations are supported by individual mycotoxin data available in the literature, where some inhibitory effects on lymphocytes activation, cytokines secretion and expression of surface markers were reported either for DON or FB. Taken together, it was suggested that an inappropriate response was developed following antigenic challenge, especially after the co-contamination exposure. In addition to these findings on the systemic response, we also analyzed the effects of mycotoxins on the intestine. The main histological findings observed were lymphatic vessel dilation, eosinophilic granulation within the cytoplasm of enterocytes, villi flattening, and a reduction in the number of goblet cells.

Most of these changes were observed in the proximal jejunum and following DON ingestion. The specificity of the affected region could be related to a greater absorption of the toxin or to a specific response in this area. A weaker effect was obtained for the co-contaminated diet, likely due to the absence of effects in the individual FB diet and to the low dose of FB used.

Immunohistochemistry in the current experiment showed that expression of E-cadherin, a protein involved in the paracellular permeability, was significantly decreased all along the gastrointestinal tract, especially in the median and distal jejunum. By contrast with the histological findings, this deficiency in E-cadherin expression was greater after the co-contaminated diet ingestion. This observation might be linked with our results on cytokines expression. Indeed, it has been described that cytokines could play a key role in the regulation of intercellular tight junctions and adherent junctions, involved in the paracellular intestinal permeability. Our real time RT-PCR analysis showed that IL-1 $\beta$ , TNF- $\alpha$  and IFN- $\gamma$  mRNA were upregulated all along the digestive tract, especially in the median and distal jejunum, and after co-contamination exposure.

Augmentation of these three cytokines has been reported to be responsible of the disruption of intestinal permeability, especially in intestinal inflammatory diseases. Nonetheless, this hypothesis in our experiment warrants further investigations, and analysis of tight junctions, such as claudin-4 and occludin, are in progress.

To conclude, at the systemic level, exposure to low doses of DON or FB induces histopathological lesions in the liver, the kidney and the lung. It also impairs the immune response of piglets, especially during a vaccination protocol. Ingestion of co-contaminated diet induces greater histopathological lesions and higher immune suppression than ingestion of mono-contaminated diet. At the intestinal level, our findings suggest that low doses of these mycotoxins affect the barrier function of the gut.



An impairment of the intestinal absorption of nutrients and a predisposition of animals to infections by enteric pathogens through alteration of the intestine integrity, have to be considered. These results may have some impacts on the current regulation/recommendation that only take into account individual mycotoxins and not the co-contamination.

**Keywords:** deoxynivalenol, fumonisins, co-contamination, subclinical doses, systemic and intestinal toxicity.

## EFFECTS OF DIETARY OREGANO (*ORIGANUM VULGARIS*) INCLUSION IN WEANED PIGLETS DIET ON IRON EXCRETA, ABSORPTION, AND IRON STATUS

Untea Arabela<sup>1</sup>, Criste Rodica Diana<sup>1</sup>,  
Radutoiu Daniel<sup>2</sup>, Ionescu Valentin<sup>3</sup>

<sup>1</sup> National Research and Development Institute for Biology and Animal Nutrition (IBNA),  
077015 Balotești, Calea București, 1, jud. Ilfov, Balotesti, Romania,

<sup>2</sup> Craiova University, A.I.Cuza, 13, 200585, Craiova, Dolj, Romania,

<sup>3</sup> Institute of Food Bioresources, Str. Dinu Vintila, 6, Bucharest, Romania.

A 4-week study conducted on 16 weaned piglets (average initial weight 15 kg) evaluated the effects of the dietary oregano (*Origanum vulgare*) used in the presence/absence of phytase on Fe excreta, absorption and iron status while reducing/eliminating its inclusion in the diet as inorganic salts. Oregano was harvested from the wild flora and the Fe concentrations that were taken into consideration (1873,98 ppm) was the consensus values obtained in an interlaboratory study involving 7 participants. The piglets were assigned to 4 groups (C, E1, E2, E3), housed in individual metabolic cages and fed on corn-soybean meal-based diets. The diet of the control group (C) with addition of 1% inorganic mineral premix (IP), contained 110 ppm Fe. The experimental diets differed from C diet as follows: E1 – 3% oregano, 0% phytase (5000 PU/g), 0% IP; E2 – 3% oregano, 0% phytase, 0.5% IP, E3 – 3% oregano, 0.01% phytase, 0,5% IP. Groups E1, E2, E3 included in the diet 0.5% Zn of the PP, because the dietary oregano amount didn't meet the requirements (NRC) for piglets. The balance of Fe was performed for 5 days every week. The Fe was determined by FAAS in the samples (weekly samples/piglet) of ingesta, faeces and urine. The iron excreta was in good correlation ( $R^2 = 0.9791$ ) with Fe ingested.



The amount of Fe excreted through faeces for group E1 was significantly lower ( $p \leq 0.05$ ) than the groups with IP (C, E2, E3). It was noticed that the dietary Fe ingested by the group without IP was 12% (297,54 ppm) lower than C, the absorption coefficients were with 33,5 % lower than for group C (47,66%). For the groups with 0.5% IP (E2, E3), where the dietary Fe wasn't significantly different ( $p \leq 0.05$ ) than the C group, the absorption was about 5-7% (45,33% and 44,35%) lower than for group C. No significant differences were noticed for Fe in terms of excreta and apparent absorption, between the groups (E2, E3) with/without phytase. The deposits of Fe in the main organs and serum have been also evaluated in the samples collected from slaughtered piglets at the end of the study.

**Keywords:** iron, oregano, piglet, excreta, balance.

## THE INFLUENCE OF A BACTERIAL INOCULANT ON REDUCTION OF AEROBIC MICROFLORA DURING ENSILING OF ALFALFA

Ivana Čabarkapa<sup>1</sup>, Dragan Palić<sup>1</sup>, Dragomir Jeremić<sup>2</sup>, Dragana Plavšić<sup>1</sup>

<sup>1</sup>Institute for Food Technology, Novi Sad, Serbia  
e-mail: ivana.cabarkapa@fins.uns.ac.rs

<sup>2</sup>Schaumann Agri Austria GmbH & Co. KG,  
Vienna, Austria

Silage produced from forage crops such as grass, maize and alfalfa form the major part of the feed ration of cattle and sheep in Europe. The main principles of forage preservation by ensiling are a rapid achievement of a low pH by lactic acid production and the maintenance of anaerobic conditions. The quality of silage depends on the competition between different groups of micro-organisms. Lactic acid bacteria, responsible for the silage fermentation process, usually dominate the silage microflora. In addition, a number of undesirable micro-organisms that occur at low levels on fresh plant materials may grow during the storage of silage and lead to anaerobic or aerobic spoilage. The aim of this study was to examine the effect of added inoculant on the reduction of aerobic microflora during ensiling of alfalfa.

The alfalfa was treated in laboratory conditions with a commercial silage inoculant *Bonsilage Plus*, which contains *Pediococcus pentosaceus* (DSM 12834), *Lactobacillus brevis* (DSM 12835), *Lactobacillus buchneri* (DSM 12856), *Lactobacillus plantarum* (DSM 12836) and *Lactobacillus rhamnosus* (NCIMB 30121). As a control was used alfalfa without added inoculant. Both experimental and control samples were done in triplicates. The sampling was conducted on days 7, 15 and 55 and the total number of bacteria and the total number of yeasts and moulds were determined.



The results showed that the addition of inoculant to alfalfa silage had influence on its aerobic microflora. The total number of bacteria and the total number of yeasts and moulds were lower in experimental samples than in control on all sampling days, as compared to day 0 i.e. in the fresh alfalfa.

Reduction of the total number of bacteria in silage on day 7 in the control sample was 5.9%, whereas the silage with inoculant had reduction of 55.9%. The reduction of the number of bacteria continued during ensiling in both experimental and control samples, but was higher in the silage with inoculant. On days 15 and 55, the control samples had reduction of 82.4% and 88.3% respectively, whereas in experimental samples the reduction was 93.4% and 98.2% respectively. The control sample did not show any reduction in total number of yeasts and moulds on day 7, while that reduction in inoculated silage was 11.7%. The reduction of number of yeasts and moulds in control and experimental samples on day 15 was 11.7% and 50% respectively, whereas on day 55 the reduction was 94.2% in the control and 99.1% in the inoculated sample.

The results of this study showed beneficial effects of silage inoculant Bonsilage Plus with regard to reduction of aerobic microflora in alfalfa silage, thus contributing to lowering the possibility of secondary fermentation and related losses of silage nutritive value.

**Keywords:** silage, microflora, alfalfa, lactic acid bacteria.

## PRODUCTION AND PURIFICATION OF DEOXYNIVALENOL PRODUCED BY THE HIGHLY TOXINOGENOUS *FUSARIUM GRAMINEARUM* STRAIN

C. Tabuc<sup>1</sup>, J.D. Bailly<sup>2</sup>, A. Querin<sup>2</sup>, P. Guerre<sup>2</sup>

<sup>1</sup>National Institut of Reaserch and Development for Biology  
and Animal Nutrition, Balotesti, Romania

<sup>2</sup>National Veterinary School, Toulouse, France

Deoxynivalenol, DON, 12,13-epoxy-3 $\alpha$ , 7 $\alpha$ ,15-trihydroxy-9-trichothecen-8-one or vomitoxine are a secondary metabolite, produced by the *Fusarium* species (*F. graminearum*, *F. culmorum*, *F.crookwellense*, *F. sporotrichoides*, *F. poae*, *F. trichinctum*, *F. acuminatum*), species which know a broad geographical distribution. The most frequent species are *F. graminearum* and *F. culmorum* which contaminate cereals mainly by producing deoxynivalenol. This substance is implied in the animal and human intoxications, characterized by the gastrointestinal disorders This work aimed to improve the conditions of production and purification of deoxynivalenol in the laboratory in order to produce great quantities being able to be used in experimental intoxications on the poultry. We used a strongly toxinogenous strain of *Fusarium graminearum* (*F. graminearum* F6G10) isolated from wheat. The influence of the substrate, the temperature and the time of incubation on the deoxynivalenol production were tested. The optimum conditions for production correspond to a culture on the rice, to 50% of water content, 25°C during 5 weeks. Under these conditions the production of DON was of 5 to 6 g of deoxynivalenol/kg of material of culture. The composition of the extracts obtained is the following one: 80% DON and 20% pigments coming from rice. Purification of the extracts by passage on the column charcoal-aluminium oxide allowed the elimination of the pigments and obtaining sufficiently pure extract to be used by the oral way.

**Keywords:** *Fusarium graminearum*, deoxynivalenol, production, purification.



## GENETIC DIVERSITY OF HONEY BEE ECOTYPES IN TURKEY BASED ON MICROSATELLITES

**Meral KEKEÇOĞLU**

Düzce University, Faculty of Science, Department of Biology,  
81620 Konuralp/Düzce, Turkey

In the present study Genetic analyses of diversity were performed on five honey bee population. Microsatellites which are among the preferred molecular markers at subspecies level because of their high polymorphism and codominant inheritance were used to study genetic differentiation among five honey bee population. In total 86 honey bee colonies were genotyped for 8 microsatellite markers (A008, A024, A043, A088, A113, Ap068, Ap226, Ac306).

We detected heterozygosity levels ( $H_e$ ), mean number of alleles per population, presence of diagnostic alleles and pairwise Nei values. High percentage of genetic variance was found within populations (94%). Mean heterozygosity ( $H_e$ ) was to change between 0.484-0.551. It was determined a very high level of genetic divergence between Yığılca province of Düzce city and Kırklareli in Thrace region based on pairwise population Nei genetic distance (0.295).

This study provides with us a large amount of information which can be useful to develop genetic conservation strategies.

**Keywords:** Biodiversity, honeybee, microsatellite, Turkey.

## HONEY BEE BIODIVERSITY IN WESTERN BLACK SEA AND EVIDENCE FOR A NEW HONEY BEE ECOTYPE IN YIĞILCA PROVINCE

Meral KEKEÇOĞLU<sup>1</sup>, Feyzullah KONAK<sup>2</sup>, M. İ. SOYSAL<sup>3</sup>

<sup>1</sup>Düzce University, Faculty of Science, Department of Biology,  
81620 Konuralp-Düzce, Turkey  
meralkekecoglu@duzce.edu.tr

<sup>2</sup>Ordu Beekeeping Research Center, Ordu-Turkey  
fkonak52@gmail.com

<sup>3</sup>Faculty of Agriculture, Department of Animal Science Namik Kemal  
University, Tekirdağ-Turkey

**Objective:** The purpose of the study was to investigate the genetic variability of honey bee (*Apis mellifera* L.) populations of Western Black Sea by using geometric morphometric analysis and mtDNA marker.

**Material and method:** For this study, 650 young worker honey bees were collected from 13 different areas of Western Black Sea. The geometric morphometrics analysis was done using the coordinates of 18 landmarks located at vein intersections of the fore right wing. Genetic structure of these honey bee populations were also studied by means of RFLP analysis of two mtDNA gene segment. Total DNA was extracted, then 16s rDNA (965 bp) and COI (1028 bp) were amplified using PCR and sequently tested for *SspI* and *DraI* resitricion enzyme profiles.

**Results:** 34 out of 36 cartesian coordinates of landmarks, displayed statistically significant differences among proposed grouping ( $P < 0.005$ ).



In the CVA analysis, honeybee population of Yiğilca clearly separated from the remaining groups. UPGMA dendogram showed similar and significant differences between the groups except Mudurnu. Both *SspI* restriction polymorphism of COI gene segment of mtDNA and Principal Component analysis of the coordinates of 18 landmarks clearly showed that honey bees of Yiğilca province in Düzce were discriminated from the other population of western Black Sea.

**Conclusion:** As the results, endemic honey bees of Yiğilca province were described as a different ecotype. The above mentioned results are very useful for the conservation of Turkish honey bees but further investigation is necessary.

**Keywords:** honey bee, geometric morphometrics, forewing, mtDNA, PCR-RFLP.

## LIPOPEROXIDATION IN CATTLE: CONSEQUENCES ON ANIMAL HEALTH AND MEAT NUTRITIONAL QUALITY

**Durand D<sup>1</sup>, M. Gobert<sup>1,2</sup>, C. Gladine<sup>1,3</sup>, E. Parafita<sup>4</sup>,  
D. Gruffat<sup>1</sup>, D. Bauchart<sup>1</sup>**

<sup>1</sup>Research Unit on Herbivores, INRA, Research Centre of Clermont-Ferrand/Theix,  
63122 Saint-Genès-Champanelle, France  
e mail : durand@clermont.inra.fr  
e mail : bauchart@clermont.inra.fr  
e mail : gruffat@clermont.inra.fr

<sup>2</sup>Research Unit on Quality of Animal Products, Research Centre of Clermont-Ferrand  
/Theix, 63122 Saint-Genès-Champanelle, France  
e mail : gobert@clermont.inra.fr

<sup>3</sup>Human Nutrition Unit, Research Centre of Clermont-Ferrand/Theix,  
63122 Saint-Genès-Champanelle, France  
e mail : Cecile.Gladine@clermont.inra.fr

<sup>4</sup>Association for the Development of Meat Industry, 63000 Clermont-Ferrand, France  
e mail : emilie.parafita@adiv.fr

Lipoperoxidation is a self-propagating biological reaction, initiated by reactive oxygen species (ROS), which abstract protons from fatty acids (FA), the most sensible FA being polyunsaturated FA (PUFA) of the n-3 family. Lipoperoxidation severely alters structure and function of mammalian cells and can produce toxic metabolites unless ROS are rapidly neutralised by antioxidant. Indeed, ROS are overproduced under oxidative stress conditions which are frequent in domestic animals (food deprivation, injury, transport, handling...) leading to deterioration of important physiological functions (growth, reproduction, immunity...). On the other hand, lipoperoxydation can affect qualities of bovine products (meat, milk) particularly during processing.



To limit the adverse effect of lipoperoxydation, various anti-oxidants can be added to animal diets, vitamin E (vit E) being the most often used in animal nutrition, but its efficiency is limited especially under specific conditions (n-3 PUFA rich diet, slaughter in high stress conditions, meat processing...).

Therefore, we have developed different experimentations in order to select and test new sources of antioxidants, natural and bioefficient in the animal and its products. We focused our research on plant extracts (such as rosemary, grape, citrus and marigold) providing different families of polyphenols (PERP). A mixture of plant extracts rich in polyphenols (10g/kg DM) combined with vit E (375 UI/kg DM), given to lactating dairy cows fed n-3 PUFA-rich diets (50g lipids/kg diet DM) in mid lactation., was the most effective (compared with vitamin E alone) to reduce plasma lipoperoxidation. In finishing cull cows, being sensibilized to lipoperoxidation by n-3 PUFA supplement (40g lipids from extruded linseed/kg diet DM), a combined supply of PERP (7g/kg DM) and vitamin E (155UI/kg diet DM) was also the most effective to reduce plasma lipoperoxidation intensity, even in animals stressed 2h before slaughter. Moreover, these antioxidants improved lipid protection of n-3 PUFA-rich beef against lipoperoxidation amplified by packaging treatments of beef under oxygen or a pre-slaughter stress of animals. Additionally, supplementation of diets with vit E + PERP increased beef colour stability, a favourable factor for beef purchase by consumer. These original results led to beneficial applications for the beef industry allowing preservation of nutritional and sensorial qualities of beef and a possible increase of the duration for sale and consumption of beef products.

**Keywords:** Lactating cows, cull cows in finition, lipid supplemented diets, lipoperoxydation, antioxidant supplements, plant polyphenols, vitamin E, qualities of processed beef, animal health.

## COMPARED IMPACT OF LIPID SUPPLEMENTS ON THE NUTRITIONAL QUALITY OF MUSCLE FATTY ACIDS IN NORMAND AND BLOND D'AQUITAINE CULL COWS

**Bauchart D.<sup>1</sup>, Thomas A.<sup>1</sup>, Habeanu M.<sup>1,2</sup>, Durand D.<sup>1</sup>, Normand J.<sup>3</sup>**

<sup>1</sup>Research unit on Herbivorous, INRA , Research Centre of Clermont Ferrand/Theix,  
63122 Saint-Genès-Champanelle, France  
e mail : bauchart@clermont.inra.fr  
e mail : agnes.thomas@clermont.inra.fr  
e mail: durand@clermont.inra.fr

<sup>2</sup>Institute of Biologie and Animal Nutrition (IBNA), Balotesti, Romania  
e mail: mihaela.habeanu@ibna.ro

<sup>3</sup>Institute for Animal Breeding, Meat Quality Group,  
Baldassini Str. 69364 Lyon cedex 07, Fr  
e mail: Jerome.Normand@inst-elevage.asso.fr

In a view of production of beef with improved nutritional value for human, characteristics of muscle lipid content and fatty acid (FA) composition were studied in 32 Normand cows with rapid lipogenesis (N,) (57wks-old; BW: 673kg; BW gain: 1.68kg/d) and in 32 Blonde d'Aquitaine cows with slow lipogenesis (BA,) (31wks-old, BW: 694kg; BW gain: 1.68kg/d).

Animals were given for a 100d finishing period, four rations (8 animals/treatment) with concentrate (70% DM) and straw (30% DM) based, offered alone (diet C) or supplemented in lipids (400g/d) from extruded linseeds (diet L, rich in 18 : 3n-3), a mixture of extruded rapeseed (2/3) and linseed (1/3) (diet RL, rich in 18 : 2 n-6 et 18 : 3n-3) (Valorex, France) or palmitostearin (rich in 16 : 0 et 18 : 0) (diet P) (Vegegold, Sonap, France).



Samples (150g) of *longissimus thoracis* (LT) muscle were collected 1d *post mortem*, and then reduced into an homogeneous powder by mixing in N<sub>2</sub> liquid and their lipids were extracted according to the Folch method. Beef fatty acid methyl esters (FAME) were prepared by transmethylation in Na methylate followed by BF<sub>3</sub>-methanol 14%. FAME were analyzed by GLC-FID and their *trans* 18 : 1 isomers by preparative HPLC followed by GLC-mass spectrometry.

For all diets, total lipids of BA cows were 25% lower ( $P < 0.001$ ) in LT muscle than that of N cows (2.9% DM) in relation to the lower lipogenic capacity of BA cows, but lipid contents did not vary significantly for each given breed with lipid supplemented diets. With the control diet, BA beef was lower in saturated FA (SFA) (42.6 vs 47.7%,  $P < 0.05$ ) to the benefit of poly-unsaturated FA (PUFA) (10.8 vs 6.8%;  $P < 0.05$ ) leading to a PUFA/SFA ratio 1.8 higher in BA beef than in N beef, more beneficial for the human health. Diets supplemented in lipids (from linseed or the mixture rapeseed + linseed), decreased, for the two breeds, the level of 16 : 0 (pro-atherogen) (-7%,  $P < 0.05$ ) to the benefit of 18 : 0, an anti-atherogenic FA (+2%, NS). Addition of palmitostearin in diet generally increased 18 : 0 (+7 and +17% in N and BA beef respectively) but with no effect on 16 : 0. Therefore, the three lipid supplements improved the health value of SFA by decreasing the ratio 16 : 0/18 : 0 in beef FA.

The most beneficial effect on PUFA was noted with linseed supplementation and especially in BA cows with a higher deposition of 18:3n-3 (x 4,8,  $P < 0.05$ ), whereas palmitostearin had no significant impact on beef PUFA for the the two breeds. Deposition of long-chain n-3 PUFA (beneficial for human) of type 20 : 5n-3 (EPA) and 22 : 5n-3 (DPA) were favoured by the linseed diet, but DHA (22 : 6n-3), a very limiting n-3 LC-PUFA for human, was not stimulated, whatever the diet or the bovine breed.

Finally, *trans* 18 : 1 were quantitatively increased by the linseed or the mixture rapeseed + linseed supplements (+40%,  $P < 0.01$ ) whereas palmitostearin had no effect in the BA breed or a decreasing effect in N breed (-27%,  $P < 0.05$ ).

*Trans* 18 : 1 were dominated by the  $\Delta 10$  *trans* isomer (detrimental for human health) in the C diet composed of concentrate/straw 70/30 (51 and 64% for N and BA beef respectively), the level being decreased to the benefit of  $\Delta 11$ tr isomer (anti-atherogen) by the addition of palmitostearin and linseed supplements only in N beef.

In conclusion, the animal breed (in relation to the lipogenic capacity of fat cells) and lipid supplements (varying by the FA composition) strongly modulate lipids and FA composition of beef respectively. In the Normand cows, lipid supplements provided by linseed or the mixture linseed + rapeseed had the most favorable effects on the PUFA/SFA and n-6 PUFA/n-3 PUFA ratios. In the Blonde d'Aquitaine, beef lower in lipids than that of N cows were dominated by phospholipids rich in PUFA that explained the more favorable impact of dietary linseed or rapeseed + linseed supplement on the deposition of n-3 and n-6 PUFA. This led to a PUFA/SFA higher than 0.4 (0.2 for N cows), an important index for a better nutritional and health value of beef FA for the consumer.

**Key words:** bovine breeds, lipid nutrition, muscles, fatty acids, beef nutritional quality.



## THE EFFECT OF SELECTED RUMEN FAUNA ON MUREIN DIGESTION IN THE RUMEN OF SHEEP

Grzegorz Belzecki<sup>1</sup>, Renata Miltko, Elżbieta Kwiatkowska,  
Tadeusz Michalowski,

The Kielanowski Institute of Animal Physiology  
and Nutrition Polish Academy of Sciences.  
Instytutcka 3, 05-110 Jabłonna, Poland

Microorganisms inhabiting in the rumen represent three different taxonomic groups i.e. bacteria fungi and protozoa. The most common interaction between protozoa and bacteria is predation. Predation is a two step process composed of an engulfing of bacteria and degradation of their cell wall consisting mainly of murein. However, the involvement of protozoa in the metabolism, of murein is poorly recognized. Thus the aim of our studies was the examination of the influence of selected species of rumen ciliates on the total mureinolytic activity and the amount of bacterial biomass in the rumen.

The studies were performed on three Żelezieńska rams equipped with permanent rumen fistulae. The animals were either free of the natural rumen fauna (control period) or inoculated selectively with either one of the three species of ciliates i.e. *Eudiplodinium maggii*, *Diploplastron affine* and *Entodinium caudatum* or with natural rumen fauna (experimental period). Daily ration of feed composed of 1.5 kg meadow hay and 0.260 kg ground barley. The food was given at 8 a.m. and 8 p.m. in two equal portions. The period of preliminary feeding lasted three weeks and was followed by the sampling period. The samples of rumen fluid were taken at 8 a.m. at noon and at 4 and 8 p.m. to measure of mureinolytic activity and bacterial mass. The collection was repeated three times.

It was found that mean mureinolytic activity varied from 4.1 and 11.7  $\mu\text{g}/\text{Micrococcus lysodeikticus}/\text{g DM}$  of rumen content. The lowest degradation rate of murein was found in ciliate free sheep and the highest in the sheep *inoculated with Entodinium caudatum* and in sheep containing the natural rumen fauna (11.1  $\mu\text{g}/\text{Micrococcus lysodeikticus}/\text{g DM}$  of rumen fluid).

The bacterial biomass was influenced by ciliated fauna. The establishment of protozoa in the rumen of ciliate free sheep was accompanied by the drop in bacteria biomass from 309 mg to 180 mg/g DM of rumen fluid.

**Keywords:** rumen microorganism, Źelezieńska rams, species of rumen ciliates, mureinolytic activity.



## SPECIAL CONOTATIONS CONCERNING BOVINE SENSITIVENESS TO MYCOTOXINS

Podar C.<sup>1</sup>, Pop A.I.<sup>1</sup>, Oroian I.<sup>1</sup>, Cucoran D.<sup>2</sup>

<sup>1</sup>Stațiunea de Cercetarea Dezvoltare pentru Creșterea Bovinelor Tg. Mureș

<sup>1</sup>Research and Development Station for Cattle Breeding Tg. Mureș

<sup>2</sup>Direction of Animal Health Tg. Mureș

Research conducted several years at Research and Development Station for Cattle Breeding Tg. Mureș was made to complete the study for the fungus of fodder plants and their impact on bovines and to develop a comprehensive program to protect the health of plants, animals and humans.

The large ruminants especially bovines are more resistant to attack of mycotoxins, of which the most important are aflatoxins, because of the following causes: heavy weight of the animals, the big volume of liquid consumption, existence of the four stomachs: the rumen, reticulum, psalterium and rennet, the existence of rumen microsymbionts (bacteria, infusors, fungi), the long length of intestines, presence of phytohormones from plants, the complex structure of rumen papillary system with a high surface of absorption, etc.

The calves are susceptible to attack of mycotoxins (aflatoxins and ochratoxin, but DON and zearelon too). Diarrhea syndrome was reproduced experimentally by subcutaneous injection of aqueous extract of beet and turnip moldy, with the whole symptomatic and morpho-histopatologic suite: severe liver, thyroid, thymus and adrenal lesions.

**Keywords:** mycotoxins, cattle, sensitivity, lesions.

## MATHEMATICAL MODEL FOR OPTIMISING POULTRY DIETS

**R. Burlacu**

National Research and Development Institute for Biology  
and Animal Nutrition (INCDBNA),  
077015 Balotești, Calea București, 1, jud. Ilfov, Balotești, Romania,

The new systems which assess the nutritive value and determine the nutrient requirement triggered changes in the manner of formulation and development of optimised poultry diets. The purpose of this paper is to present a viewpoint on a possible solution for diet optimisation. We considered the determination of a possible “common denominator” between the nutritional requirements, mathematical algorithms that can be applied to the stated problem and the economic aspects assimilated as purpose functions in formulating the mathematical models that are used.

**Keywords:** mathematical modeling, poultry, metabolic processes, computer simulation, feed optimization.



## EFFECT OF ZINC METHIONINE SUPPLEMENTATION ON PRODUCTIVE PERFORMANCE OF LACTATING FRIESIAN COWS

H.M.A. Gaafar<sup>1</sup>; M.I. Bassiouni<sup>2</sup>; M.F.E. Ali<sup>2</sup>;  
A.A.Shitta<sup>1</sup>, A.Sh.E. Shamas<sup>1</sup>

<sup>1</sup>Animal Production Research Institute, Agricultural Research Center, Dokki, Egypt.

<sup>2</sup>Department of Animal Production, Faculty of Agriculture, Kafrelsheikh University, Egypt.

Twelve lactating Friesian cows with body weight of 450 to 550 kg and at 2<sup>nd</sup> to 5<sup>th</sup> lactating season were used after 8 weeks of calving in a complete switch-back design with three treatments (4 animals each) and three successive periods. The cows were fed the basal ration consisted of 35% concentrate feed mixture + 40% berseem + 25% rice straw (on DM basis) without supplement (G<sub>1</sub>) or supplemented with 5 and 10 g zinc methionine/head/day for G<sub>2</sub> and G<sub>3</sub>, respectively. Nutrients digestibility coefficients and nutritive values were increased significantly (P<0.05) with supplementation of zinc methionine, however, no significant differences (P>0.05) between the two levels of zinc methionine supplement. Cows in G<sub>2</sub> recorded the highest (P<0.05) feed intake of TDN and DCP followed by G<sub>3</sub>, while G<sub>1</sub> had the lowest feed intake. Intake of CFM, berseem, rice straw and total DM among the different groups were not significant (P<0.05). Ruminal pH values were not significantly affected (P>0.05), while, the concentration of TVFA's increased significantly (P<0.05) and NH<sub>3</sub>-N decreased (P<0.05) with zinc methionine supplement. Cows in G<sub>3</sub> showed the highest (P<0.05) plasma total proteins and globulin concentrations. Zinc methionine supplement led to significant decrease (P<0.05) in the activity of AST and ALT.

Supplementation of zinc methionine led to significant increase ( $P<0.05$ ) in the yield of milk for G<sub>2</sub> and G<sub>3</sub> by 2.54 and 1.95 kg/day or 18.09 and 14.17% compared with the control group, respectively. The corresponding increase of 4% FCM was 2.85 and 2.03 kg/day or 21.63 and 15.74%, respectively. Cows in G<sub>2</sub> recorded significantly ( $P<0.05$ ) the highest fat, total protein and TS contents and the yield of all milk constituents and those in G<sub>3</sub> showed the highest contents of lactose, SNF and ash. Zinc methionine supplement improved feed conversion, which led to significant ( $P<0.05$ ) reduction in the quantities of DM, TDN and DCP required to produce one kg 4% FCM. There were no significant differences ( $P>0.05$ ) in average daily feed cost among the different groups. Average daily feed cost per kg 4% FCM decreased significantly ( $P<0.05$ ), but average income of daily milk yield, net revenue and net revenue improvement were increased significantly ( $P<0.05$ ) with zinc methionine supplementation. Net revenue of G<sub>2</sub> and G<sub>3</sub> were increased by 42.56 and 31.31% compared with control group, respectively. Quadratic analysis showed that zinc methionine supplementation at the level of 6 g/day showed the highest actual milk and 4% FCM yield and net revenue.

**Keywords:** Zinc methionine, Friesian cows, digestibility, rumen activity, milk yield, milk composition, feed conversion, economic efficiency.



## PRODUCTIVE PERFORMANCE OF TWIN FRIESIAN CALVES IN EGYPT

**H M A Gaafar, A A Shitta, Sh M Shamiah and H A B Ganah**

Animal Production Research Institute, Agricultural Research Center,  
Ministry of Agriculture, Nadi El-Said Street, Dokki, Giza, Egypt.  
Tel.: 0020473239156 ; Fax: 0020473229507  
dr.gaafar@hotmail.com

Data from the records of 1185 single and 58 twin calvings occurring during the consecutive 8 years from 1997 through 2004 were used to study the effect of twinning on the live body weight, body weight gain, feed intake, feed conversion and economic efficiency of Friesian calves.

Results revealed that twinning rate in dairy Friesian cows was 4.67% and the percentage of freemartin was 0.64%. The number of calf per cow was higher by 1.72-1.90 for twin compared with single birth calves. The average live body weight (LBW) was significantly higher ( $P<0.05$ ) for single compared to twin calves. However, average daily gain (ADG)/LBW was nearly similar for single and twin calves.

The DM intake by single calves were significantly higher ( $P<0.05$ ) compared with twin calves. Twin calves showed significantly ( $P<0.05$ ) better feed conversion during the different age periods compared with single calves. The feed cost and cost of feed cost/ LBW were significantly lower ( $P<0.05$ ) for twin compared to single calves during the different age periods.

The output of ADG was significantly higher ( $P<0.05$ ) for single compared to twin calves during the different age periods. However, the output of ADG/LBW was nearly similar for single and twin calves. From these results it could be concluded that although the low feed intake by twin calves their showed similar ADG, lower feed cost/LBW and give more calf per cow compared to single calves.

**Keywords:** Friesian calves, twinning, body weight gain, feed intake, feed conversion and economic efficiency.

**COMPARATIVE EFFECTS OF ZEARALENONE AND ITS  
METABOLITES ON THE PROLIFERATION AND ACTIVITY  
OF SWINE CELLS INVOLVED  
IN THE ACQUIRED IMMUNE RESPONSE**

**Daniela Marin, Ionelia Țăranu, Monica Burghilea, Mariana Stancu**

National Research and Development Institute for Biology  
and Animal Nutrition, IBNA-Balotești,  
Cl. București no.1, 077015, Romania Tel: +40 (0)21 351 20 82  
ionelia.taranu@ibna.ro

Zearalenone (ZEN) is a mycotoxin that can be produced by several field fungi including *Fusarium graminearum* (*Gibberella zeae*), *F. culmorum*, *F. cerealis*, *F. equiseti* and *F. semitectum* (Richard, 2007). The major toxic effect of ZEN is the alterations in the reproductive tract of farm and laboratory animals (mice, rats, guinea pigs) (Minervini et al., 2008), but it seems that ZEN has also immune-modulatory effects. Among the all domestic species, swine (especially female pigs) are considered to be the most sensitive animal species to ZEN, followed by ruminants. The aim of the present study was to assess the *in vitro* effects of ZEN and some of its metabolites:  $\alpha$ -zearalenol ( $\alpha$ -ZOL),  $\beta$ -zearalenol ( $\beta$ -ZOL), zearalanone (ZAN) on several aspects of cellular and humoral immune response in porcine peripheral blood mononuclear cells (PBMC). Blood samples were aseptically collected by jugular vein puncture from healthy swine, and PBMC were isolated and cultivated at a density of  $2.5 \times 10^6$  cells/mL for metabolic activity measurement using MTT [3-(4,5-dimethylthiazol-2-yl) 2,5-diphenyltetrazolium bromide assay with absorbance at 570 nm (A570) as the endpoint indicator] or  $5 \times 10^6$  cells/mL for cytokine (IL-1 $\alpha$ , TNF- $\alpha$  and IL-8, IL-4, IFN- $\gamma$ ) and immunoglobulin (IgA, IgG, IgM) concentrations measurement (ELISA immunoassay).



The results obtained in the present study showed that *in vitro* incubation of porcine lymphocytes with increased concentrations of ZEN,  $\alpha$ -ZOL,  $\beta$ -ZOL and ZAN affected in a dose-dependent manner the cellular proliferation following mitogen stimulation. The proliferative response of PBMC was inhibited by concentrations higher than  $10\mu\text{M}$  of ZEN and metabolites. The antibody and cytokine synthesis were affected by the toxins exposure. Thus, after the toxins treatment, the porcine PBMC showed a significantly reduced IL-4 and TNF- $\alpha$  synthesis, at  $10\mu\text{M}$  ZEN and ZAN. By contrast, all the toxins inhibited the IgA, IgM and IgG synthesis at the concentrations of 5 and  $10\mu\text{M}$ .  $\beta$ -Zol was able to inhibit the IgM synthesis also at the  $1\mu\text{M}$  concentration. Taken together all these results suggest that ZEN,  $\alpha$ -ZOL,  $\beta$ -ZOL and ZAN altered the *in vitro* cellular and humoral immune response and this alteration was dose dependent.

**Keywords:** zearalenone, metabolites, immune response, cytokines.

## PREDICTING THE CARCASS COMPOSITION OF LAMBS BY A SIMULTANEOUS EQUATIONS MODEL

**V. A. P. Cadavez**

Mountain Research Center (CIMO), ESA - Instituto Politécnico de Bragança,  
Campus de Santa Apolónia, Apartado 1172, 5301-855 Bragança, Portugal.  
e-mail: vcadavez@ipb.pt

The objective of this study was to develop models to predict lamb carcass composition by simultaneous equations model (SEM), and to compare the efficiency of the ordinary least squares (OLS), weight least squares (WLS), and seemingly unrelated regressions (SUR) estimators. Forty male lambs, 22 of Churro Galego Bragançano Portuguese local breed and 18 of Suffolk breed were used. Lambs were slaughtered and carcasses were weighed approximately 30 min after slaughter in order to obtain hot carcass weight (HCW). After cooling at 4°C for 24-h, the subcutaneous fat thickness measurement (C3) was taken between the 12th and 13th ribs. The left side of all carcasses was dissected into muscle, subcutaneous fat, inter-muscular fat, bone, and remainder (major blood vessels, ligaments, tendons, and thick connective tissue sheets associated with muscles). The carcasses lean meat percentage (LMP), total fat percentage (FP), and bone percentage (BP) were calculated. A SEM model was fitted by OLS, WLS and SUR estimators. Models fitting quality was evaluated by the coefficient of determination, the root mean square error, and Log-likelihood statistic. This study shows that SUR estimates are consistently better than the OLS and WLS estimates for modeling the carcass composition of lambs, and this trend was noticeably visible for the LMP.



The use simultaneous equations model open a path to classify and grade lamb carcasses using the predictions of all carcass tissues rather than the use of carcasses muscle proportion as the unique pricing driver. Finally, results shows that a novel approach can be applied to the old problem of objective classification of carcasses using simple models having as predictors the HCW and the C3 measurement.

**Keywords:** bias, seemingly unrelated equations, weighted least squares, ordinary least squares.

## IMPACT OF MEASUREMENT ERRORS ON ALTERNATIVE PREDICTORS OF LEAN MEAT PROPORTION OF LAMB CARCASSES

V. A. P. Cadavez

Mountain Research Centre (CIMO),  
ESA - Instituto Politécnico de Bragança,  
Campus de Santa Apolónia,  
Apartado 1172, 5301-855 Bragança, Portugal.  
E-mail: vcadavez@ipb.pt

The objectives of this study were to evaluate the impact of measurement errors on alternative predictors of lean meat proportion (LMP) of lamb carcasses. Ninety eight lambs (72 males and 26 females) of Churra Galega Bragançana breed were slaughtered, and carcasses were weighed (HCW) approximately 30 min after exsanguination. During carcasses quartering a caliper was used to perform tissue depth measurements, over the maximum depth of longissimus muscle (LM), between the 12th and 13th ribs (C12), and between the 3rd and 4th lumbar vertebrae (C3). The C12 and C3 measurements were contaminated with simulated measurement errors, and three distributions for random error were simulated: 1) random error with mean 0 and variance of 0.25 mm ( $\epsilon \sim N(0,0.25\text{mm})$ ), 2) random error with mean 0 and variance of 0.50 mm ( $\epsilon \sim N(0,0.50\text{mm})$ ), and 3) random error with mean 0 and variance of 0.75 mm ( $\epsilon \sim N(0,0.75\text{mm})$ ). Simple and multiple linear regression models were developed using as independent variables the measured (original) and the biased C12 and C3 measurements as predictors of LMP. The coefficient of determination and the residual standard deviation were computed. This work shows that measurement errors of subcutaneous fat can have a high impact on the stability of models to predict the carcasses LMP. The subcutaneous fat measurements of higher magnitude are less sensitive to measurement errors, and give rise to more stable prediction models.

**Keywords:** Classification, Lean meat, Subcutaneous fat, Simulation.



## PRELIMINARY INVESTIGATIONS ON MILK PROTEINS POLYMORPHISM IN TELEORMAN BLACK SHEEP

**Rodica Pelmuș, Cristina Lazăr, Horia Grosu,  
Mihai Gras, Elena Ghiță**

National Research and Development Institute for Animal Biology and Nutrition;  
Cal. București. 1, Balotești; Romania;  
e-mail: pelmus\_rodica\_stefania@yahoo.com

There is an international interest for the preservation and improvement of the local animal breeds. The local sheep breeds have superior biological traits – rusticity, resistance and capacity of adaptation to very different local environment. The **Blackhead Teleorman** sheep breed fits very well the current economic demands: milk, prolificacy, early weaned suckling lamb. The use of selection assisted by molecular information is important for the improvement of the milk yield traits. The purpose of this paper was to determine the milk quality indices as well as the milk protein content and milk protein polymorphism in the local Blackhead Teleorman sheep breed, reared in the experimental farm of the INCDBNA.

The test day milk yield and the chemical composition assays performed during the milking period of the Blackhead Teleorman sheep revealed a content of  $6.346 \pm 0.44\%$  fat and  $4.815 \pm 0.273\%$  protein at the first test day milk yield,  $8.931 \pm 0.204\%$  fat and  $5.578 \pm 0.112\%$  protein at the second test day milk yield,  $7.966 \pm 0.168\%$  fat and  $5.431 \pm 0.114\%$  protein at the third test day milk yield,  $10.191 \pm 0.244\%$  fat and  $5.377 \pm 0.119\%$  protein at the fourth test day milk yield,  $8.156 \pm 0.161\%$  fat and  $5.689 \pm 0.717$  protein at the fifth test day milk yield and  $9.077 \pm 0.199\%$  fat and  $5.626 \pm 0.120\%$  at the sixth test day milk yield respectively. These results showed that the yield of milk fat and milk protein of these Blackhead Teleorman sheep ranged within the quality indices specific to the breed (6.56% fat and 5.9% protein) and described in the literature.

Milk samples from 24 Blackhead Teleorman sheep were further analyzed for milk protein content and for protein polymorphism. The average milk protein content of the analysed samples was 5.71%. SDS PAGE electrophoresis was used to determine the following proteins in the analysed milks samples: ***αs1 and αs2-casein, β-casein, k-casein, α-lactalbumin and β-lactoglobulin***. Migrated protein bands were obtained for each analysed milk sample, with different expressions within the same type of protein. Our result showed that the highest average band volume was noticed for ***β-casein*** (41264.42), followed by ***k-casein*** (28804.96), ***αs1-casein*** (28678.58), ***αs2-casein*** (23632.92), ***β-lactoglobulin*** (23236.42) and ***α-lactalbumin*** (19409.83) respectively. For a higher certitude of these results we will subsequently perform a real time PCR analysis of the polymorphic genes of the milk proteins, which will show the genetic variants from the locus of each protein.

**Keywords:** sheep, local breed, milk quality parameters, αS1-casein, β-casein, SDS-PAGE, milk proteins, polymorphism.



## INTESTINAL ALKALINE PHOSPHATASE, DIET AND HEALTH

Jean-Paul Lallès

INRA, Unité 1079 SENAH, F-35590 Saint-Gilles, France

One of the major roles of intestinal alkaline phosphatase is the detoxification of lipopolysaccharide (LPS), a component of Gram-negative bacteria. LPS is more and more recognized as an important trigger of diet-related diseases in humans, ranging from low grade inflammation to obesity and metabolic diseases. Many reports suggest that diseases involving LPS can be alleviated by oral supplementation with exogenous alkaline phosphatase. Health problems involving LPS have also been reported for farm animals. Therefore, understanding how this enzyme can be modulated by the diet in order to limit LPS toxicity and prevent related diseases is of utmost importance. Literature analysis indicates that alkaline phosphatase is positively correlated with food or energy intake and that many dietary components, including fat, protein and carbohydrate modulate intestinal alkaline phosphatase. Preliminary data suggest intestinal alkaline phosphatase to be sensitive to early life programming. The report reviews the knowledge on intestinal alkaline phosphatase and its modulation by the diet.

**Keywords:** intestinal alkaline phosphatase, lipopolysaccharide, human diet, metabolic diseases.

## GRAPE SEED POLYPHENOLIC EXTRACTS-ANTIOXIDANT AND CYTOTOXIC ACTIVITY

**Veronica Sanda Chedea<sup>1</sup>, Sonia Moussouni<sup>2</sup>, Michael Ladomery<sup>3</sup>,  
Christopher Mintoff<sup>3</sup>, Panagiotis Kefalas<sup>2</sup>**

<sup>1</sup>National Research and Development Institute for Animal Biology and Nutrition,  
Cal. București. 1, Balotești, Romania,  
e-mail: chedeaveronica@yahoo.com

<sup>2</sup>Department of Food Quality and Chemistry of Natural Products,  
Mediterranean Agronomic Institute of Chania,  
Centre International de Hautes Etudes Agronomiques Méditerranéennes, Chania,  
PO Box 85, 73100 Chania, Crete, Greece

<sup>3</sup>RNA Biology Group, School of Life Sciences, University of the West of England,  
Coldharbour Lane, Bristol BS16 1QY, UK

Grape seeds are waste products of the winery and grape juice industry. These seeds contain lipid, protein, carbohydrates, and 5-8% polyphenols, depending on the variety. Grape seed antioxidant polyphenols contain flavan-3-ols as monomers (catechin, epicatechin, galocatechin, epigallocatechin and epicatechin 3-O-gallate) but also as procyanidin dimers, trimers, and highly polymerized procyanidins, aside from phenolic acid precursors (gallic acid). For this reason, the grape seed extract is to be considered as a powerful antioxidant that prevents premature aging and disease.

Dietary supplementation of farm animals with  $n - 3$  polyunsaturated fatty acids ( $n - 3$  PUFA) is becoming an accepted practice to improve the nutritional quality of lipids in animal products (*e.g.*, meat, milk, eggs). However, this nutritional strategy to increase the proportion of  $n - 3$  PUFA in plasma also enhances the susceptibility to lipoperoxidation which has been implicated in the deterioration of many physiological functions including growth, reproduction and immunity.



Dietary antioxidants are efficient means to limit lipoperoxidation *in vivo* and recent investigations have focused on natural molecules to satisfy consumer concerns over safety and toxicity.

Five grape seeds extracts were evaluated by Liquid Chroma-tography coupled with Mass Spectrometry (LC-MS) for their com-position in polyphenols. Their antioxidant activity was assayed by determination of the reducing ability of grape seed extracts using a protocol based on the ferric reducing/antioxidant power (FRAP assay), the antiradical activity (DPPH Assay), chemiluminescence and Rancimat measurements. The cytotoxicity of these extracts was evaluated on PC<sub>3</sub> prostate tumoral cells using WST-1 reagent. The stable tetrazolium salt WST-1 is cleaved to a soluble formazan by a complex cellular mechanism that occurs primarily at the cell surface. This bioreduction is largely dependent on the glycolytic production of NAD(P)H in viable cells. Therefore, the amount of formazan dye formed directly correlates to the number of metabolically active cells in the culture. Our results showed that grape seed extracts presented antioxidant activity and did not exhibit statistically significant cytotoxic effects which allow us to recommend them as dietary supplements in order to balance the lipoperoxidation.

**Keyword:** grape seed extracts, antioxidant, cytotoxicity, polyphenol composition, lipoperoxidation.

## NATIONAL AND INTERNATIONAL GENETIC EVALUATION FOR DAIRY AND BEEF CATTLE: PAST, PRESENT AND FUTURE

**Raphael Mrode**

Scottish Agricultural College, Sir Stephen Watson Building,  
Bush Estate, Penicuik, EH26 0PH, Scotland UK

Huge economic benefits have been achieved as a result of genetic improvement in beef and dairy cattle. Undergirding these genetic improvement programmes is the accurate genetic evaluations of animals on which selection are based. In the dairy cattle, evaluations were based on the simple Contemporary Comparison up to the 1960s. This was replaced by the modified Contemporary Comparison to adjust for the average genetic merit of the sires of herd mates and also for genetic trend. Genetic evaluation methods were completely transformed with the introduction of Best Linear Unbiased Prediction (BLUP) in 1950. BLUP gradually became the method of choice for genetic evaluation at the national level. Currently about 30 countries submitting data for International evaluation at the Interbull centre, utilise BLUP based methodology for their national evaluation. In Beef cattle, most evaluation methods are based on BLUP multivariate models usually accounting for maternal effects.

However, the longitudinal nature of the data for the dairy cattle resulted in further developments. Thus covariance functions and random regression methods for genetic evaluation for productive traits were introduced in the early 1990's.

Improvements in reproductive technologies in the form of embryo transfer, freezing of semen and embryo have resulted in huge international trade in cattle. This has resulted in the emergence of a global breeding structure for dairy and beef cattle.



This created the need to provide genetic evaluation for dairy sires. Initial methods were based on computing conversion formulae based on bulls with breeding values in the two countries of interest. Interbull was formed in 1983 to handle these operations. In 1986, a linear model that accounts for effects of the country and genetic groups was introduced. This was replaced by the Multiple Across country Evaluation (MACE) in 1994 which accounted for the genetic correlation among countries. Developments in international evaluations have been slower in beef cattle. Interbull started the Interbeef project 2006.

Recent developments in molecular biology have resulted in the emergence of genotyping technology for single nucleotide polymorphism (SNP). Due to linkage disequilibrium between SNPs and quantitative trait loci for economic traits, breeding values can be computed directly for animals on the basis of SNP effects. These are referred to as genomic breeding values (GEBV) which can then used to select animals (genomic selection). A high density SNP chip of 800k has just been developed for the dairy cattle. In future, it is possible that the genome of some key sires might be fully sequenced making possible to almost impute the genome of their progeny and a host of related animals. Breeding value prediction will then simply comprise of summing the SNP effects over the whole genome for an animal.

**Keyword:** dairy cattle, methods for genetic evaluation, Linear Unbiased Prediction (BLUP), covariance functions, random regression, Multiple Across country Evaluation (MACE), single nucleotide polymorphism (SNP).

## GENETIC MARKERS FOR MILK PRODUCTION AND BREEDING-OUT-OF SEASON IN SHEEP

**Raluca Mateescu**

Department of Animal Science,  
209D Noble Research Center Oklahoma State University Stillwater,  
OK 74078-6051

Understanding the genetic mechanism responsible for controlling seasonality of reproduction and milk production will lead to more effective genetic improvement programs and will allow management of groups of animals according to their ability to reproduce in or out of season. To achieve this goal, interval mapping was undertaken in a backcross pedigree specifically designed to map QTL contributing to aseasonality of reproduction and milk production.

Several traits describing the out-of-season phenotype were used: the number of estrous cycles and maximum level of progesterone prior to breeding, pregnancy status determined by progesterone level, ultrasound, lambing status and number of lambs born. The regularity of estrous cycles based on the progesterone profile created for each ewe was also considered. Seven chromosomes (1, 3, 12, 17, 19, 20 and 24) harbored putative QTL for one or more component traits used to describe aseasonal reproduction.

Breeding values for milk yield were estimated and subsequently used in interval mapping along with other milk yield-related traits including peak milk yield and cumulative milk yield to 50, 100, and 250 days. Ovine chromosomes 2, 12, 18, 20, and 24 harbored putative QTL for various measures of milk production. All regions were syntenic with bovine chromosomal segments revealed to harbor QTL affecting milk production traits, providing supporting evidence for the identified QTL.



Deciphering the genetics of complex traits is one of the major challenges in the post-sequence era, and domestic animals have the potential to make significant contributions toward comprehending the regulation of such traits. The results from this genome-wide scan are a first step toward understanding the genetic mechanism of these two complex traits and show that variation in aseasonal reproduction and milk production is associated with multiple chromosomal regions.

**Keywords:** sheep, milk production, aseasonal reproduction, genetic markers.

**SIMULTANEOUS DETERMINATION OF CREATININE  
AND PURINE DERIVATIVES IN RUMINANT URINE  
BY AN ADAPTED DAD HIGH PERFORMANCE LIQUID  
CHROMATOGRAPHY METHOD**

**Mihaela Vlassa<sup>1</sup>, Catalin Dragomir<sup>2</sup>**

<sup>1</sup>Babes-Bolyai University, Raluca Ripan Institute for Research in Chemistry,  
30 Fântânele Street, RO-400294 Cluj-Napoca, Romania;  
e\_mail: mihaela\_cecilia@yahoo.com

<sup>2</sup>National Research & Development Institute for Animal Biology and Nutrition  
(IBNA Balotesti), Calea Bucuresti nr. 1, Balotesti, Ilfov,  
077015, Romania

The paper describes a HPLC method adapted to the simultaneous determination of purine derivatives and creatinine in ruminants' urine. Samples taken within a digestibility trial on growing rams were used for the method adaptation and assessment. The HPLC chromatograms were obtained on a HPLC Agilent 1200 chromatograph with DAD detection at 218, 234, 255, 276, 292 nm. The compounds were eluted on a Thermo Scientific ODS-2 HYPERSIL column (250 x 4.6; 5 µm) with 0.05 M (NH<sub>4</sub>)<sub>2</sub>H<sub>2</sub>PO<sub>4</sub> (pH 7.71) as mobile phase at a flow rate of 1 mL/min. No shifted or biased peaks were observed in the chromatograms of standards or samples, allowing accurate determination of creatinine, allantoin, uric acid, xanthine, hypoxanthine. The detection limit was 2.5 µg/ml and the correlation factor for the calibration curves was higher than 0.999. The method allowed simultaneous and accurate determination of creatinine and purine derivatives, thus allowing the use urine spot sampling for the estimation of rumen microbial proteosynthesis and better prediction of protein values of feeds for ruminants.



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**Keywords:** rumen proteosynthesis, urine, purine derivatives, creatinine.

**EUROPEAN FOOD SAFETY AUTHORITY (EFSA) MISSIONS,  
WITH PARTICULAR EMPHASIS ON THE ACTIVITIES  
OF ANIMAL HEALTH ANIMAL WELFARE (AHAW)  
SCIENTIFIC PANEL**

**Pascal A. Oltenacu**

Oklahoma State University, Stillwater, OK 74078-6051, USA

The major missions of EFSA are: (1) to provide scientific advice, opinions, information, and technical support for Community legislation and policies; (2) to collect and analyze data to allow characterization and monitoring of risks; (3) to promote and coordinate development of uniform risk assessment methodologies; (4) to communicate risks related to all aspects of EFSA's mandate.

EFSA has 10 scientific panels dealing with issues related to: (1) Food additives and nutrient sources added to food (ANS); (2) Food contact materials, enzymes, flavorings and processing aids (CEF); (3) Animal Health and Welfare (AHAW); (4) Biological hazards (BIOHAZ); (5) Contaminants in the food chain (CONTAM); (6) Additives and products in animal feed (FEEDAP); (7) Genetically modified organisms (GMO); (8) Dietetic products, nutrition and allergies (NDA); (9) Plant health (PLH); and (10) Plant Protection Products (PPR). The major activities of the AHAW panel are presented.

**Keywords:** EFSA, topics, activities.



## A NEW SELECTION INDEX TO IMPROVE THE PURE LINES OF LAYING HENS

H. Grosu, T. Mihalcea

<sup>2</sup>National Research & Development Institute for Animal Biology and Nutrition (IBNA Balotesti), Calea Bucuresti nr. 1, Balotesti, Ilfov, 077015, Romania

The purpose of the paper is to identify a selection criterion which to maximize the correlation with the aggregate genotype in improving the pure lines of laying hens. Three variants of selection indices were simulated: 1) the Hazel index; 2) the Osborne index and 3) a combination of the two indices, termed in the paper as the new (Hazel-Osborne) index. The simulation used two traits with heritability of 0.35 and 0.20, respectively, in a line of heavy breeds. The best indicator was selected according to the accuracy of selection, of the correlation between the selection criterion and the aggregate genotype. The highest value of selection accuracy was observed with the Hazel-Osborne index, up to 18% higher than the Hazel indicator. In conclusion, the new Hazel-Osborne selection index can be recommended for the improvement of the pure lines of laying hens.

**Keywords:** laying hens, selection indexes.

**COLLABORATIVE PLATFORM FOR ORGANISATIONAL  
COMPETITIVENESS AND KNOWLEDGE, EXPERTISE  
AND PARTNERSHIP MANAGEMENT  
IN THE FOOD RESEARCH AND DEVELOPMENT  
-POL-EX-AGRA-**

**Liviu Cotoră<sup>1</sup>, Elena Ghita<sup>2</sup>**

<sup>1</sup>Integrator S.A., Administrator

<sup>2</sup>National Research & Development Institute for Animal Biology and Nutrition  
(IBNA Balotesti), Calea Bucuresti nr. 1, Balotesti, Ilfov, 077015, Romania

The paper aims at informing the scientific community from the animal breed industry about the initiative to implement a **Knowledge Management System**, based on a virtual collaborative platform, at identifying and valuing knowledge and competence in the Agriculture and Food Industry from Romania, named POL-EX-AGRA (Excellence Pole in Food Industry).

The main players of this virtual dissemination environment will be the members of the knowledge and competence communities that are active in all the areas from the agriculture and food industry. This project has the ambition to correlate these knowledge communities with the competence communities, so that they could interact and develop fast on a global performance level, the key knowledge and competence in order to turn the Romanian Food Industry into a competitive one.

It is compulsory to build this type of system as the collective intelligence of the Food communities could provide an added value on the whole knowledge chain, from innovation up to the final product valorization on the market.



This collaborative platform constitutes a dynamic virtual environment where the contributions of all the communities from the Food Industry divided into channels, processes, activities groups, competence, competence units, knowledge, and expertise work together and provide an indispensable support for innovation management.

The initiators of the platform are: Institute of Food Bio-resources (IBA), Research Institute for Agriculture Economics and Rural Development (ICEADR), University of Agricultural Sciences and Veterinary Medicine (USAMV), National Research and Development Institute for Animal Biology and Nutrition (INCDBNA), Academy of Economic Studies (ASE), Integrator SA (platform developer and operator).

**Keywords:** Knowledge Management, collaborative platform, food industry.

## THE EFFECT OF INCLUDING WHOLE RAPESEED AND LINSEED IN DAIRY COWS DIETS ON THE MILK FATTY ACIDS PROFILE

Smaranda Pop<sup>1</sup>, C. Dragomir<sup>1</sup>, M. Nicolae<sup>2</sup>, Mariana Ropotă<sup>1</sup>, I. Stoica<sup>2</sup>,  
D. Dragotoiu<sup>2</sup>

<sup>1</sup>National Research Development Institute for Animal Biology and Nutrition,  
Balotesti, Romania

<sup>2</sup>University of Agricultural Sciences and Veterinary Medicine, Bucuresti, Romania

The effect of dietary whole rapeseed and linseed on fatty acids profile in milk fat was studied on five experimental groups of lactating dairy cows: C - control (no seed/oil supplement), RS – rapeseed, RMO – rapeseed meal + rapeseed oil, LS – linseed, LMO - linseed meal + linseed oil. Animals were fed limited amounts of alfalfa hay and compound feed and corn silage ad libitum. Compound feeds designed for the experimental groups contained 19.7% whole rapeseed (RS), 14% rapeseed meal and 5.5% rapeseed oil (RMO), 19.9% whole linseed (LS) and 14.6% linseed meal and 5.4% linseed oil (LMO). The dietary whole rapeseed and linseed led to differences in milk fatty acids profile. The relative proportion of some unsaturated fatty acids increased compared to the control (e.g. oleic and linoleic acids: 135-150% cis forms, C18 : 1n9c; 140-300% trans forms, C18 : 2n6t) while the relative proportion of some saturated fatty acids (capric, lauric, myristic, palmitic) decreased slightly. CLA has clearly increased in diets with added oils (210-250%). The use of unprotected whole rapeseed or linseed/oils in dairy cows diets influenced the fatty acids profile of milk and can be an opportunity to release on the Romanian market new brands of dairy products claiming to be healthier for the consumers, which may ensure higher sales or higher prices.

**Keywords:** fatty acids profile, dairy cows, whole rapeseed, whole linseed.



## WHEAT CULTIVARS BEHAVIOUR, THEIR RESISTANCE TO DISEASE ATTACK AND MYCOTOXIN PRODUCTION IN 2010 TRIALS

**Pop I.A., Lobontiu Iustina, Podar C.**

SCDCB Mureş (Research Station For Cattle Breeding Mureş)

Climatic conditions in central Transylvania during late spring and summer favored the development of plant diseases especially of those generated by fungus with high mycotoxin yield capacity.

Mycotoxins contained in forages cause different health issues on farm livestock as decreasing the forage intake and bioconversion, serious illness and death. Food and Agriculture Organization (FAO) appreciates on global level that 25% of agricultural products are contaminated with mycotoxins. These compounds contaminate feeds before and after harvesting.

The paper work presents a part of activities performed in a research project and comprises their results on preventing and control of fungi and mycotoxins. The experimental results refers to a study of the behavior of 9 wheat cultivars and 3 triticale cultivars in comparative trials in 2009-2010 on experimental plot of SCDCB Tg. Mureş. Samples were taken from fertilized and non fertilized parts of the experimental field and sent to laboratory for deoxynivalenol and zearalenone quantification. Results show a high fusarium contamination and alarming DON and ZEA concentrations.

**Keywords:** fusarium mycotoxins, crops.

## FUNGAL CONTAMINATION AND THE LEVELS OF MYCOTOXINS (DON AND OTA) IN CEREAL SAMPLES FROM MURES COUNTY FARMS

Pop I.A.<sup>1</sup>, Curticapean A<sup>1</sup>, Toma Felicia<sup>2</sup>, Curticapean Manuela<sup>2</sup>,  
Podar C.<sup>1</sup>, Oroian I.<sup>1</sup>

<sup>1</sup>SCDCB Mures ( Research Station For Cattle Breeding Mureş)

<sup>2</sup>UMF Mureş (University of Medicine and Pharmacy Mureş)

Food quality monitoring on each stage, especially due to it's fungal potential risk is very important for the development of antifungal strategies adapted to local conditions. Thorough the research project "Complex program of prevention and control of fungus infestation for grain and fodder for providing animal wealth and consumer protection' has achieved a status of monitoring infestation of feed and food grain with fungus and mycotoxins in various units and sectors located in the Development Region Center.

Action was initiated in early June in a maximum period of susceptibility to the incidence of mycotoxins deposit being made by the team of researchers from SCDCB Mures Tg Mures. 33 samples were taken from 9 production units.

The quantification of mycotoxins was made at UMF Mures (Mureş University of Medicine and Pharmacy) through a HPLC method developed by authors able to quantify simultaneous three mycotoxines. Mycotoxins targeted were: aflatoxin B1, ochratoxin A and zearalenone.

**Keywords:** screening, mycotoxins, fungus, method.



## THE USE OF TRACER IN DETERMINING CROSS CONTAMINATION OF MEDICATED FEEDS

**Jovanka Levic<sup>1</sup>, Slavica Sredanovic<sup>1</sup>, Lj. Levic<sup>2</sup>, Olivera Đuragić<sup>1</sup>,  
S. Pavkov<sup>3</sup>, Ljiljana Kostadinović<sup>4</sup>**

<sup>1</sup>University of Novi Sad, Institute for Food Technology, Novi Sad, Serbia;  
e-mail: jovanka.levic@fins.uns.ac.rs

<sup>2</sup>University of Novi Sad, Faculty of Technology, Novi Sad, Serbia

<sup>3</sup>*Institute for Medicinal Plant Research „Dr. Josif Pančić“, Belgrade,  
Tadeuša Koščuška 1, Serbia*

<sup>4</sup>*Faculty of Biofarming, Bačka Topola, M. Tita 39, Serbia*

Topic about cross contamination medicated feeds is of current developing interest largely because the European Union and other major world markets are developing new food and feed regulations that are much more aggressive than what have existed in the past. The European Union now requires that all feed meals whether they mix drugs in feeds or not must be registered with their national governments. Further, they must also have data validating the adequacy of their mixing and of their control of contamination at their feed meals and premix plants. The issue of medicated feed contamination into non-medicated feeds is not new. Such residues at high levels may be toxic for another animal (turkey, horse.).

Feeds often contain large number of ingredients that can make analysis for drug at very low levels difficult or in some cases effectively impossible. It is possible to test for cross contamination of drugs into non-medicated feed when drug is formulated at a very high level in the medicated feed of better premix and when it has a good assay at relatively low levels.

Another approach is to mix sample, easy to detect tracers most often colored iron particle into a medicated feed or premix and to determine the tracer rather than the drug, at a least as a screening procedure.

The objective of this paper was to demonstrate methods for determining cross contamination of medicated feeds and show the results achieved cross contamination in compound feed plant.

**Keyword:** cross contamination determining methods, drugs, medicated feed.



## THE EFFECT OF ALBUMINOUS FEEDSTUFFS IN THE DIETS ON THE PIG GROWTH INTENSITY AND MEAT QUALITY

**Violeta Juškienė, Raimondas Leikus, Remigijus Juška, Jūratė Norvilienė**

Institute of Animal Science of Lithuanian University of Health Sciences,  
R. Žebenkos str. 12, Baisogala LT-82317, Radviliškio distr.,  
e-mail violeta@lgi.lt

In feeding trial with fattening pigs was carried out at the Institute of Animal Science of LUHS to determine the effect of albuminous feedstuffs on pig growth, feed consumption, carcass, meat and fat quality. In Trial three analogous groups of pigs of 12 animals each were made up according to their parentage, age, weight, body conditions score and gender. During the trial the pigs were kept in equal conditions that met all hygiene requirements. Growing pigs were offered adequate diets containing field beans (20-25%), sweet lupines (15–20%) in place of soybean or sunflower oilmeal (control). The research data were processed with R – statistical package (Version 1.8.1 ISBN: 3-900051-00-3).

In Trial replacement of soybean and sunflower oil-meals in the compound feed with 20% of field bean and 15% of lupin meal for growing pigs (up to 60 kg weight) and 25% of field bean and 20% of lupin meal for finishing pigs (over 60 kg) had no significant influence on the growth and feed intake of pigs. The weight and length of the carcass, dressing percentage, weight of ham, chemical composition and physical indicators of meat of pigs fed diets with different leguminous seeds did not differ significantly from those of pigs fed the control diet, except that lupine meal by 18.4 % ( $P < 0.05$ ) decrease the colour intensity of the meat and tendend to increase the content of polyunsaturated linoleic and linolenic acids in backfat ( $P > 0.1$ ). Pigs fed diets containing field beans had 5.7-8.2 mm lower backfat thickness.

**Keywords:** soybean, lupine, bean, pig growth, pork quality.

## LISTA AUTORI

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Bauchart D.	46	Liviu Cotoră	74
Belzecki G.	49	Marandici E.	6
Burlacu R.	52	Marin D.	56
Čabarkapa I.	14	Mateescu R.	68
Čabarkapa I.	38	Mehdi Ghaderi Jouybari	7
Cadavez V. A. P.	58	Miltko R.	26
Cadavez V. A. P.	60	Mrode R.	30
Chedea S. V.	64	Mrode R.	66
Drăgotoiu D.	23	Ogah D. M.	3
Dudu A.	19	Oltenacu P.	72
Durand D.	44	Patriche T.	5
Ergun Demir	9	Pelmuş R.	61
Gaafar H. M. A.	53	Podar C.	51
Gaafar H. M. A.	55	Pop I. A.	77
Georgescu S. E.	24	Pop I. A.	78
Grenier B.	32	Pop S.	76
Grosu H.	73	Popova T.	13
Julean C.	20	Rahimian S.	15
Juškienė V.	81	Sandu Gh.	21
Kekeçoğlu M.	41	Ştef L.	10
Kekeçoğlu M.	42	Ştef L.	12
Kirchner Al.	25	Tabuc C.	40
Kiril F.	17	Tamaş V.	18
Kononenko S.	22	Untea A.	36
Lallès J. P.	63	Vamanu E.	4
Lefter N.	28	Vlassa M.	70
Levic J.	79		