

**РЕЗЮМЕТА  
НА НАУЧНИТЕ ПУБЛИКАЦИИ  
НА ДОЦ. Д-Р МАЯ МИТКОВА ИГНАТОВА**

**EFFECT OF AROMA SUPPLEMENTATION IN RABBITS**

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*Krmiva, (2005), 47(5):239-243*

The 45d experiment was conducted to study the effect of aroma supplementation to the diets on growth performance, feed efficiency and carcass characteristics of fattening New Zealand White rabbits. There were two treatment groups: one without a supplement and the other with 0.03% aroma TIMIKO. The body weight gain, feed intake and utilization, and carcass characteristics were determined.

Rabbits fed the aroma diet grew faster ( $P < 0.001$ ) than the rabbits, fed the control diet (37.3 v/s 34.0 g, respectively). TIMIKO addition increased average daily feed intake by 7.5% (144 v/s 134 g, respectively) and improved feed conversion ratio by 4.0%. No differences in dressing percentage were observed.

**INFLUENCE OF THE NUTRITIONAL ADDITIVE OVOCAP IN PHEASANTS II. PHYSICOCHEMICAL COMPOSITION OF M. PECTORALIS AND M. BICEPS FEMORIS**

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*Bulgarian Journal of Agricultural Science, (2005), 11:595-601*

The study was carried out with 40 pheasants (20 males and 20 females) in order to study the effect of the nutritional additive OVOCAP on the physicochemical composition and the adipocyte ' size in m. Pectoralis and m. Biceps femoris. The birds at the age of 7 months were divided in one control and two experimental groups. The period of the study was 10 weeks, during which the birds were treated 4 times with OVOCAP. The dozes of the additive were 0.250 ml and 0.500 ml per bird respectively for the first and second experimental group. The studied characteristics were as follows: pH 24 h post mortem, water-holding capacity (WHC), muscle color (R/525 nm), myoglobin, protein and fat contents.

Higher value of pH 24 h post mortem was found in m. Pectoralis of the female pheasants treated with lower doze of the additive. No effect of the additive 6n this trait was found in m. Biceps femoris.

The nutritional additive OVOCAP has the highest influence on the muscle colour in the pheasants form the first experimental group- significantly

brighter in the males ( $P < 0.100$ ) and females ( $P < 0.05$ ). The lower amount of the additive influences significantly m. Biceps femoris in the female birds ( $P < 0.05$ ). In this muscle, OVOCAP has affected the myoglobin content in both male and female birds. The pheasants from the two experimental groups have significantly lower content of myoglobin than those from the control group ( $P < 0.100$  and  $P < 0.05$ ).

The lower amount of the additive increases intramuscular fat in the male pheasants compared to those from the control group.

In the birds of both sexes from the experimental groups there is a trend of or significantly lower diameter of the adipocytes ( $P < 0.100$  and  $P < 0.05$  for the males and females respectively).

## **MANIPULATING OF THE CARCASS AND MEAT QUALITY IN LAMB MEAT PRODUCING FOR THE EUROPEAN MARKET II. FATTY ACID COMPOSITION OF FAT DEPOTS OF LAMBS GROWN UNDER TWO DIFFERENT PRODUCTION SYSTEMS**

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Bulgarian Journal of Agricultural Science, (2005), 11: 603-610

A study with 20 male lambs of local Zapadnostaroplaninska sheep breed was carried out at the Institute of Animal Science - Kostinbrod. After weaning, at age of 75 days, half of the animals were allowed to graze natural pasture, and additionally received concentrates of 250g/d/animal. The other 10 lambs were grown indoors with ad libitum access to a diet of commercial concentrate, and hay. At age of 135 days the animals of both groups were slaughtered and samples of three internal (perirenal, caul, sweetbread) and a subcutaneous fat depots were taken for lipid analysis.

In both production systems the fatty acid composition of reserve adipose tissues varied in a depot-specific way. Relatively more 18:0 and less -18:1 fatty acids in the internal fat depots and a higher level in the subcutaneous fat depots were found. The triacylglycerols of the four studied depots in extensive grown animals were more saturated, but contained relatively more linolenic (18:3n-3) fatty acid, with a better 18:2n-6/18:3n-3 ratio, than in indoors grown lambs. On the other hand, the higher amounts of reserve lipids of intensive raised animals contained more 18:0, 18:1 and 18:2n-6 fatty acids, and less of so called "dangerous" 14:0 and 16:0 fatty acids. The results obtained suggest that the fatty acid profile of carcass fat could be manipulated using an appropriate production system, but it is a question of decision which one or a combination should be chosen.

## **EFFECT OF FISH OIL SUPPLEMENTED DIET ON THE**

## **PERFORMANCE, CARCASS COMPOSITION AND QUALITY IN LAMBS**

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Bulgarian Journal of Agricultural Science, (2007), 13: 729-737

Two groups of seven animals (age 75 days) each of local Zapadnostaroplaninska sheep breed were fed for 28 days controlled iso-nitrogenous diets, containing either no added fat (control) or fish oil (experimental) added at 2.5 % of wet weight of concentrate.

Dietary fish oil supplementation did not induce significant changes in the feed intake and average daily gain of the animals. Carcasses from both groups were light <13 kg according to (S) EUROP system and classified in category (B). The carcasses from the fish oil supplemented animals had lighter colour and increased thickness (by 33-16%) of the back fat over *m.Longissimus dorsi* at the 11<sup>th</sup> rib. Half carcass weight and the weights of separate carcass cuts tended to be lower in the lambs fed fish oil. The percentage distribution and the weight of the meat, bones and fats in the half carcass did not differ significantly among the groups. The subcutaneous fat deposition differed among the separate cuts in response to fish oil supplementation. Its content was significantly reduced in the loin of the animals from the experimental group ( $P<0.05$ ).

Fish oil increased the intramuscular fat content in the half carcass of the lambs by 16 % and stimulated its deposition in the separate cuts, significantly in the shoulder ( $P<0.05$ ).

The deposition and distribution of body fat observed in this study suggest that the polyunsaturated fatty acids from the fish oil could be a repartitioning factor for carcass fats in lambs and could have a favorable effect on the carcass fatness and quality.

## **EFFECT OF THE PROBIOTIC “LACTINA” ON SOME BIOLOGICAL PARAMETERS AND NONSPECIFIC RESISTANCE IN NEONATAL PIGS**

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Biotechnology in Animal Husbandry, (2008), 1-2:87-96

Twenty four pregnant Danube white sows were allocated to four groups. All animals were fed basal diet formulated to meet their nutrient requirements. In addition to the basal diet, the sows from the II group were given the probiotic “Lactina” (500 g/ton) from the 5 day of pregnancy until the weaning of their offspring (35 days of age ) and their piglets were offered 800 g/ton Lactina during the pre-starter period and 500 g/ton throughout the starter period. The probiotic was only supplemented to the sows in the III group and

to the piglets of the IV group in the same quantities as those in the second group.

Both sows and piglets diets in the I (control) group were not supplemented with Lactina. Blood samples were taken from 20 randomly chosen piglets (5 in each group) at 5 and 35 days of age.

The probiotic Lactina, supplemented both to the sows and piglets diets (II group) , increased complement activity in the piglets ( $P<0.05$ ) at 5 days of age compared to control group, while the addition of Lactina to sows only (III group) or to piglets only (IV group) did not produce significant effect.

Supplemental Lactina decreased plasma cholesterol level ( $P<0.05$ ) at 35 days of age in II group of piglets. Plasma indol level declined in the piglets of the II group at the age of 35 days, while urea level were not changed in any of the Lactina supplemented groups, with the exception of the IV group where the piglets had higher ( $P<0.001$ ) urea level at 5 days of age.

Taken together our results indicate that the beneficial effect of Lactina on the nonspecific response and on the studied biological parameters is most emphasized when the probiotic is supplemented both to the sows and piglets diets.

Besides, Lactina stimulated complement activity at the beginning of the neonatal-period (5 day) and had no effect at the end of the neonatal period (35 day).

## **EFFECT OF DIETARY INCLUSION OF PROBIOTIC ON CHICKENS' PERFORMANCE AND SOME BLOOD INDICES**

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Biotechnology in Animal Husbandry,(2009), (5-6):1079-1085

This experiment was conducted to investigate the effects of probiotic supplementation on the performance and some blood constituents in chickens. The probiotic contained *Lactobacillus* and *Bifidobacterium* strains. Two hundred one-day-old male chickens were allocated in two experimental groups for seven weeks: control group (unsupplemented diet) and treatment group (with probiotic addition). Individual live weight of all birds, feed intake and feed conversion rate per group were determined on a weekly and overall basis. Carcass quality and blood constituents were determined at the end of the experiment. The administration of probiotic affected positively body weight ( $P<0.001$ ), feed intake and feed conversion rate by 7.7 and 8.1%, respectively ( $P>0.05$ ) compared to the control group. Lower concentrations of serum cholesterol and triglycerides were observed in the treatment group. The probiotic addition reduced the fat content of the chicken meat.

## **EFFECT OF BETAINE ON EGG PERFORMANCE AND SOME BLOOD CONSTITUENTS IN LAYING HENS REARED INDOOR UNDER NATURAL SUMMER TEMPERATURES AND VARYING LEVELS OF AIR AMMONIA**

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Bulgarian Journal of Agricultural Science, (2011), 6: 859-866

A research was initiated to determine the effect of supplemental dietary betaine on egg performance and some blood indices in 2-year-old laying hens reared under natural summer temperatures and varying ammonia levels. 99 laying hens were allocated into three groups: I - control; II - supplemented with 0.7 g/kg betaine and III - supplemented with 1.5 g/kg betaine. The hens were kept on deep litter in a windowless poultry house for 23 days. The results of this study indicated no change in terms of egg quality (albumen weight, albumen index, yolk weight, yolk index, yolk color score, Haugh unit, egg specific gravity), hematocrit and leukocyte counts.

The hens given 0.7 g/kg supplemental dietary betaine had higher erythrocyte number ( $P < 0.05$ ) than those given 1.5 g/kg supplemental betaine. Feeding 1.5 g/kg supplemental betaine resulted in significant decrease of heterophil percentage ( $P < 0.05$ ) and increase of lymphocyte percentage ( $P < 0.05$ ) at d 22, when air ammonia level was 3 times higher than permitted. These changes in leukocyte subpopulations led to a decrease of heterophil/ lymphocyte ratio. Plasma corticosterone levels at d 22 were lower in the I ( $P > 0.05$ ), II ( $P < 0.05$ ) and III group ( $P > 0.05$ ) relative to the correspondent values at d 8. Both levels of supplemented betaine increased ( $P < 0.001$ ) the average egg production.

Our results suggest that supplemental betaine has a positive effect on egg performance in hens reared under high air ammonia conditions.

## **EFFECT OF COCONUT OIL SUPPLEMENTATION ON THE CARCASS COMPOSITION AND MUSCLE PHYSICOCHEMICAL CHARACTERISTICS IN LAMBS**

*T. Popova, M. Ignatova, P. Marinova, D. Abadjieva*

Biotechnology in Animal Husbandry, (2011), 27 (3):1139-1145

A study was carried out with 10 male lambs of Bulgarian dairy synthetic population. The animals were divided in two groups - control and experimental as the diet of the latter was supplemented with coconut oil in amount 20g/d per animal for a period of 90 days. After finishing the experiment, complete slaughter analysis was done on the half carcasses of

the animals from both groups and pH 24h, colour, water holding capacity, content of myoglobin, fat, protein, moisture and ash in *m. Longissimus dorsi* and *m. Semimembranosus* were determined. The coconut oil supplementation led to significant increase of the contents of the subcutaneous ( $P<0.001$ ) and intermuscular fat ( $P<0.05$ ) in the half carcass and its individual parts as well, and influenced significantly the colour of the muscles which was darker in the lambs of the experimental group. Specific deposition of fats in dependence on the location in the carcass was observed. The content of subcutaneous fat was lowest in the neck and highest in the loin, whereas that of intermuscular fat was lowest in the leg and highest in the shoulder of the lambs. Significantly higher water holding capacity ( $P<0.05$ ) in *m. Longissimus dorsi* and myoglobin content in *m. Semimembranosus* ( $P<0.01$ ) were observed, due to the differences in the type of the muscles.

## **EFFECT OF LECITHIN SUPPLEMENTATION IN STANDARD DIET FOR WEANED PIGS ON GROWTH PERFORMANCE AND BLOOD CHOLESTEROL LEVEL**

*M. Todorova, M. Ignatova, M. Petkova*

Archiva Zootechnica, (2011), 14 (4):45-50.

The objective of this experiment was to study the effect of lecithin addition to the diets on the performance and blood cholesterol in weaned pigs.

Sixteen weaned cross-breed pigs (initial body weight  $13.15\pm 0.05$  kg) with two replicates were randomly allocated to two experimental groups for three weeks. The experimental design consisted of two dietary treatments: 1) control diet – not supplemented; 2) experimental diet – supplemented with lecithin at a level of 1%. Individual pigs' body weights were recorded weekly. Feed intake and feed conversion rate were determined at the end of the trial. Blood samples were collected to determine total serum cholesterol concentration. The lecithin addition enhances average daily gain by 10.6% and reduced the serum cholesterol level by 20%.

## **PERIPHERAL BLOOD LEUCOCYTES DISTRIBUTION AND ADRENAL FUNCTION IN GROWING PIGS, FED PROBIOTIC SUPPLEMENTED DIET**

*D. Gudev, S. Popova-Ralcheva, P. Moneva, M. Ignatova*

Bulgarian Journal of Agricultural Science, (2012), 18(1):112-116.

The objective of this study was to evaluate adrenal status, peripheral blood leucocytes distribution and activity of the enzymes (AST) and (ALT) in piglets during the neonatal period.

Pregnant Danube white sows ( $n=24$ ) were allotted to 4 groups as follow: the

sows and their piglets did not receive supplemental probiotic (“Lactina”); both the sows and piglets diets were supplemented with probiotic; the supplemental probiotic was only given to the sows (their piglets were deprived of “Lactina”); the supplemental probiotic was only given to the piglets. The diet for sow was supplemented with “Lactina” (500 g/ton) from 85 day of pregnancy until weaning of their piglets (35 days of age). Piglets were given 800 g same probiotic per ton diet during the pre-starter period and 500 g/ton during the starter period.

Probiotic “Lactina” had no significant effect on plasma cortisol level, neutrophil/lymphocyte ratio and aspartate aminotransferase activity at both 5 and 35 d age. Alanine aminotrasferase activity was higher in II group at 5 ( $P>0.05$ ) and 35 d of age ( $P<0.01$ ). It is concluded that the increased ALT activity in the second group of piglets was due to the psychological stress induced by the screaming of the previously handled pigs during the sampling.

## **STATE OUTLOOK OF THE BULGARIAN ANIMAL PRODUCTION AFTER ACCESSION OF BULGARIA TO THE EU**

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*Biotechnology in Animal Husbandry, (2012), 28 (2):155-166*

An analysis of the Bulgarian Livestock development for the period 1990-2010 was made. The major conclusions were as follow:

Bulgarian animal husbandry collapsed during the period 1990-2010. After the entry of Bulgaria into the EU there was a trend towards revival. The way out of the crisis depends on an active intervention of the country.

Grants in animal husbandry were insufficient and do not create interest in the livestock development. It's necessary to increase the national payments for farmers breeding animals. In this direction may be sought other decisions as well. Bulgarian's perspectives in the field of animal husbandry are in the following directions: sheep, goat and buffalo breeding, meat cattle and organic farming. Financial incentives for producers of animal products to construct processing plant.

It is imperative for initiate national intervention about returning Bulgaria and its products to markets of Russia, former USSR countries and Arab countries with its specific animal husbandry products.

## **PHYSICO-CHEMICAL QUALITY CHARACTERISTICS OF ROYAL JELLY FROM THREE REGIONS OF BULGARIA**

*R. Balkanska, I. Zhelyazkova, M. Ignatova*

*Agricultural Science and Technology, (2012), 4(3):302-305*

The objective of the present study is to investigate the composition and physico-chemical properties of fresh royal jelly (RJ) samples from Sofia (n=5), Lovech (n=5) and Varna (n=3), produced from May to August 2011. The samples were kept frozen at -20°C before analysis. The parameters of royal jelly samples obtained from Sofia region varied within the following ranges: water content (61.7-65.2%), proteins (15.07-16.85%), fructose (3.73-5.05%), glucose (2.01-3.70%), sucrose (1.50-2.27%), total sugars (8.05-10.37%), pH (3.94-4.06), total activity (3.86 – 4.51 ml 0.1 N NaOH/g) and electrical conductivity (180 – 206 µS/cm). The samples from Lovech region gave the following results: water content (59.10 – 62.70%), proteins (16.84 – 19.63%), fructose (4.07 – 5.47%), glucose (3.69 – 5.28%), sucrose (0.36 – 3.59%), total sugars (8.12 – 13.48%), pH (3.86 – 3.97), total acidity (3.68 – 4.42 ml 0.1 N NaOH/g) and electrical conductivity (196 – 216 µS/cm). Fructose, glucose, sucrose and total sugars contents are in the range 3.64–4.27%, 2.69 – 5.87%, 2.28 – 3.44%, 9.15 – 12.87%, respectively for the samples from Varna region. The minimum and maximum values for other parameters are: water content (63.30 – 65.80%), proteins (12.23 – 13.08%), pH (3.60 – 3.70), total acidity (2.48 – 4.23 ml 0.1 N NaOH/g), electrical conductivity (173 – 181 µS/cm). Because of the small number of samples and absence of information about additional feeding of bees with sugar solution, it should be insufficient to draw conclusion about the prevalence of glucose or fructose in fresh royal jelly. This work indicated slight differences between the obtained results of royal jelly samples from three regions of Bulgaria.

## **QUALITY TRAITS OF BREAST AND THIGH MUSCLES IN THREE CHICKEN GENOTYPES**

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World's Poultry Science Journal, (2013), 69, Supplement

The experiment was carried out with male birds belonging to the three genotypes (100/group): fast-growing stock crossbreed Cobb (Cobb); slow-growing synthetic population line "RB" (RB) and male-chickens layer-type crossbreed Lohmann-Brown Classic (LBC). Birds were intensively reared and fed "ad libitum", a diet containing 3,050 kcal/kg energy and 23.19% of crude protein. The trial was finished when birds reached about 1,400 g of live weight in different age. Six birds from each group were slaughtered and carcasses were cooled for 24 h. All carcasses were dissected and ultimate pH, water binding capacity (WBC), colour at R/525 nm, myoglobin, moisture, protein, fat, ash and cholesterol were measured in the breast and thigh. No significant differences concerning WBC and myoglobin were found in

the breast muscles. Significantly higher ultimate pH values for Cobb and RB compared to LBC ( $P < 0.001$ ) were measured. The darkest breast meat and highest moisture values were determined in Cobb compared to LBC ( $P < 0.05$ ). The Cobb compared to RB had lower color ( $P < 0.05$ ) values and higher fat ( $P < 0.001$ ) content. The Cobb had lowest protein content ( $P < 0.05$ ;  $P < 0.01$ ) and highest fat content ( $P < 0.001$ ), compared to the other two. The RB had lowest protein content ( $P < 0.01$ ) and highest moisture ( $P < 0.05$ ), fat ( $P < 0.001$ ), ash ( $P < 0.001$ ) and cholesterol ( $P < 0.05$ ) content compared to LBC. The values of ultimate pH and cholesterol content in thigh did not display significant differences. Compared to Cobb, RB had higher values of WBC ( $P < 0.01$ ) and lowest content of myoglobin ( $P < 0.001$ ) and protein ( $P < 0.05$ ). The highest values of moisture, colour and fats and the lowest values of myoglobin, protein and ash were observed in Cobb compared to LBC ( $P < 0.01$ ;  $P < 0.001$ ). The RB compared to LBC had significantly higher values of moisture ( $P < 0.05$ ), fats ( $P < 0.001$ ) and lowest values of WBC ( $P < 0.05$ ), myoglobin ( $P < 0.001$ ), protein ( $P < 0.001$ ) and ash ( $P < 0.05$ ).

## **EFFECT OF SUPPLEMENTARY HONEY AND ARTIFICIAL SUGAR FEEDING OF BEES ON THE COMPOSITION OF ROYAL JELLY**

*R. Balkanska, I. Zhelyazkova, M. Ignatova, B. Kashamov*

*Agricultural Science and Technology, (2013), 5(3):335-338*

The purpose of this study was to assess the effect of supplementary honey and artificial sugar feeding of bees on the composition of royal jelly. A total of 29 royal jelly samples were harvested and analyzed from May to August 2012. The results obtained show the following values for royal jelly samples harvested from bee colonies fed with sugar solution: water content (58.30–63.50%), proteins (15.04–18.79%), fructose (4.30–6.91%), glucose (2.87–4.43%), sucrose (1.39–4.19%), pH (3.65–4.18), total acidity (3.69–4.46 ml 0.1 N NaOH/g), electrical conductivity (166.00–214.00  $\mu\text{S/cm}$ ). The respective physicochemical parameters in royal jelly samples produced by feeding with honey were: water content (59.70–63.70%), proteins (15.28–18.53%), fructose (3.96–6.74%), glucose (2.64–4.49%), sucrose (1.40–3.87%), pH (3.76–4.19), total acidity (3.69–4.66 ml 0.1 N NaOH/g), electrical conductivity (174.00–191.00  $\mu\text{S/cm}$ ). Statistical analysis showed no significant differences between the physico-chemical parameters (water content, proteins, fructose, glucose, sucrose, pH, total acidity, electrical conductivity) in the feeding experiment. These data show that the studied types of feeding do not influence the royal jelly composition. These results, however, are not only essential from scientific point of view. They have also practical purposes and are important for beekeepers who produce royal

jelly.

## **INFLUENCE OF THE FOODER ADDITIVE PROGUT IN THE RATION ON THE SHEEP MILK PRODUCTION**

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Journal of Mountain Agriculture on the Balkans, (2014), 17(4):849-860

The aim of the study was to assess the influence of the fodder additive Progut in the diet on the sheep milk production. The experiment was conducted with 40 ewes of the Synthetic population Bulgarian milk from the flock of the Institute of Animal Science – Kostinbrod. The duration of the experiment was 180 days. The sheep were divided in two groups (control and experimental) each containing 20 ewes. The animals were equal in age, lactation, milk production and type of birth. The feeding of the sheep was in groups, according to the norms with constant access to water. The consumption of fodder was controlled daily. The difference in the feeding of the two groups was that the experimental group received 0.2% Progut per day added to the concentrated fodder. The milk production was tested every 15 days. The test day milk and the milk production for the 120 days milking period were determined. The composition of the milk – fat, protein and dry matter were determined for a 20-ml sample of milk using a milk analyzer Ecomilk, Bultech Company. The obtained information was evaluated using the methods of variation statistics. The observed 6.9% higher milk production for a standard 120 days milking period in the experimental animals did not show significant influence of the studied product on the sheep milk production. The inclusion of Progut kept the fat, protein and dry matter percentages in the ranges normal for sheep milk.

## **DETERMINATION OF SELECTED PHYSICOCHEMICAL PARAMETERS OF BULGARIAN HONEYDEW HONEY**

*R. Balkanska, M. Ignatova*

Journal of Mountain Agriculture on the Balkans, (2014), 17(3):558-571

Honey has been used since ancient times both as a food and as a medicine. During the last years, bee products got an increasing importance as essential natural resources in promoting healthy food.

A total of nineteen honeydew honey samples from different regions of Bulgaria and from the market were examined by selected physicochemical parameters, including colour, water content, specific rotation, pH, free acidity, electrical conductivity. In addition, the content of hydroxymethylfurfural (HMF) for eight honeydew honey samples from the market was measured. The HMF of honeydew honey samples varies within

the limits of 18.35 – 30.14 mg/kg. This study does not demonstrate remarkable variations in physicochemical parameters of honeydew honey samples from different regions of Bulgaria and from the market. Correlations between colour and electrical conductivity, colour and free acidity for all samples were found to be statistically significant ( $P < 0.05$ ).

## **CARCASS COMPOSITION AND PHYSICOCHEMICAL CHARACTERISTICS OF *M. LONGISSIMUS DORSI* AND *M. SEMIMEMBRANOSUS* IN PIGS CROSSES OF YOUNA AND PIETRAIN**

*P. Marinova, M. Ignatova, J. Nakev, T. Popova, M. Todorova*

Bulgarian Journal of Agricultural Science, (2015), 21(6):1272–1277

The study was carried out with 47 male castrated and female pigs, crosses of Youna and Pietrain. The aim of the work was to determine the meat productivity and quality of *m. Longissimus dorsi* (*m. LD*) and *m. Semimembranosus* (*m. SM*) in fattened pigs with a pre-slaughter weight of 105 kg (+ 2.5) and average weight of skinned and cooled carcass of 61.66 kg. The percentage of the valuable parts of the carcass was as follows: leg – 27.05%, loin - 16.89%, shoulder - 14.06%, neck - 14.76%, belly with bones - 13.74%. Muscle tissue in the half carcass had the highest percentage - 61.80%. The contents of the rest of the tissues were respectively: inter muscular fat - 8.31%, subcutaneous fat – 15.16% and bones – 14.64%. Values of pH 45 min *post mortem*, typical for PSE meat, were not found and those of pH 24 h in both muscles were within the normal range for pork. The quality traits had normal values for this kind of meat and were close for *m. LD* and *m. SM*. The content of intramuscular fat in *m. LD* was 2.61%, while in *m. SM* it was 2.36%. These values are relatively high (above 2%) and are important for the good sensory characteristics of the meat.

## **COMPARATIVE ANALYSES OF CHEMICAL COMPOSITION OF ROYAL JELLY AND DRONE BROOD**

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Bulgarian Chemical Communications, (2014), 46 (2):412-416

Royal jelly (RJ) is commonly consumed for its nutritional properties and it has been widely used in commercial medical products, health foods and cosmetics in many countries. Because of the high price of this product, sometimes RJ can be adulterated by adding other less expensive products, like drone brood (DB). Proper identification of both important products RJ and DB requires complete analysis and determination of major compounds in order to find precise descriptors for their accurate characterization. To

investigate the effect of adulteratio with DB, the chemical composition on mixtures of RJ and DB were analyzed.

Seven RJ sample and seven DB samples were analyzed for water content, protein, fructose, glucose, sucrose, total sugars, pH, total acidity and electrical conductivity. In addition, these parameters were applied to mixtures of RJ and DB samples. All samples were collected from the experimental apiaries of Institute of Animal Science and stored at -20°C before analysis.

## **EFFECT OF VITAMIN E IN THE DIET OF PIGS ON THE LIPID AND PROTEIN OXIDATIVE STABILITY OF MEAT DURING STORAGE**

*T. Popova, P. Marinova, M. Ignatova*

*Agricultural Science and Technology, (2014), 6(4):486-490*

The changes in lipid and protein oxidative stability in response to vitamin E supplementation in the diet (400 mg/kg feed) during storage of *m. Longissimus dorsi* and *m. Semimembranosus* were studied in ♀Youna x ♂Pietrain pigs. Muscle samples were stored for 6 days at 4°C after which the storage continued for up to 90 days at – 20°C. Lipid oxidation was analysed by determination of 2-thiobarbituric acid reactive substances (TBARS) formed during storage of 48 h, 6 days and 90 days. The oxidation of proteins was determined by measuring the content of carbonyls formed during the same storage periods. The muscles of the pigs from the vitamin E supplemented group showed lower TBARS content for 48 h and 6 days ( $P<0.01$ ). Significant influence of the vitamin E was observed after frozen storage ( $P<0.01$ ) as well and lower levels of TBARS were displayed in the muscles from the supplemented group. Contrary to the lipid oxidation, vitamin E supplementation of the diet only tended to decrease the oxidation of the proteins in the muscles during the storage. However, carbonyl formation differed between the muscles. During the refrigerated storage *m. Longissimus* showed higher extent of carbonylation, whereas after frozen storage the carbonyl content was increased in *m. Semimembranosus*. In both muscles lipid and protein oxidation showed the same trends of development in the control and supplemented group, showing maximal content of TBARS and carbonyls after the 90th day of frozen storage.

## **EFFECT OF DIETARY VITAMIN E SUPPLEMENTATION ON THE OXIDATIVE STABILITY OF LIPIDS AND PROTEINS IN COOKED PORK**

*T. Popova, P. Marinova, M. Ignatova*

*Agricultural Science and Technology, (2015), 7(3):379-383*

The changes in the lipid and protein oxidative stability in *m. Longissimus dorsi* (m. LD) and *m. Semimembranosus* (m.SM) in response to vitamin E supplementation in the diet (400mg/kg feed) and cooking were studied in pigs. Muscle samples were cooked at 100°C for 30 minutes. Lipid oxidation was analysed by determination of 2-thiobarbituric acid reactive substances (TBARS) and the oxidation of proteins was determined by measuring the content of carbonyls in muscles before and after cooking. Dietary vitamin E supplementation in pigs affected significantly the lipid oxidative stability by reducing the content of TBARS in fresh and cooked samples of m. LD ( $p < 0.01$ ) and m.SM ( $p < 0.001$ ). Protein oxidation was not significantly influenced by vitamin E, although the carbonyl content tended to be lower in the samples of m. SM in the supplemented pigs. In both muscles oxidative stability was affected by the high temperature showing significantly increased contents of TBARS ( $p < 0.001$ ) and carbonyls in cooked samples, regardless of presence of vitamin E in the diet.

## **ASSESSMENT OF NUTRITIVE VALUE OF PASTURES FROM THE REGION OF THE MIDDLE RHODOPAE (UP TO 1200 M)**

*M. Ignatova, L. Angelov, V. Kafedjiev, Tz. Odjakova*

Animal Science (Bg), (2001), 3:205-208.

Dynamics in nutritive value of the Middle Rhodope pasture grass (up to 1200 m altitude) was studied. Quantity of pasture grass was assessed via systematic mapping of the pastures during active pasture season (May-September). Botanical content of studied grass samples included mainly cereal grass (80%) and less legumes (8%) and other grass (12%).

Chemical composition of studied samples showed high crude protein (CP) content in the beginning of pasture season (199 g/kg DM), that decreased with development of vegetation and reached its lowest values of 79 g/kg DM in July. During second half of August pasture grass CP content reached its second peak of the seasonal curve (142 g/kg DM). The quantity of crude fats followed the same tendencies that were found for CP. With the decrease of CP the crude fiber percentage increased and reached 32.4% in the middle of July. Based on obtained data for chemical composition of studied grass samples an assessment was made of energetic value of the pasture grass through different vegetation periods by using empirical equations.

## **TRANSFER OF ESSENTIAL MICROELEMENTS ON NUTRITION CHAIN "PLANT-ANIMAL" DEVELOPING ON THE GEOLOGICAL FORMATIONS OF FOODHILL ECOSYSTEMS. II. ECOLOGICAL ASSESMENT OF FLORA AND FAUNA ZINC SUPPLY**

V. Kafedjiev, Tz. Odjakova, I. Petrova, L. Angelov, P. Todorova, M. Ignatova  
Animal Science (Bg), (2001), 3:215-220.

The transfer of zinc depending on geological origin of soils (alluvial, alluvial-diluvial, diluvial, andesite) was studied with the aid of chosen indicator plants of meadow grass from foothill pastures (295-800 m altitude) of the Balkan (Trojan) and Sredna gora (Panagjurishte). Highly significant differences in accumulating capacity of meadow plants with the change in the altitude were found. Pastures of Trojan region from 650-800 m accumulated twice more zinc in comparison with the river-side ones (respectively 47.0 and 23.5 mg Zn/kg DM). The contents of Zn in cereal grasses (predominant species) was 25% lower than in legume ones (respectively 28.5 and 37.8 mg/kg DM) in the beginning of pasture that endangered the Zn-supplementation on animals raised on alluvial and alluvial-diluvial pastures.

Exceptionally high transfer of Zn was found in meadow grass from pastures located on andesite geological formation in Panagjurishte region. Concentration of Zn significantly decreased with vegetation coming on in reached the critical minimum of 29 mg/kg DM in the second half of pasture period. In the August the level of Zn was in marginal area (22 mg/kg DM) what guaranteed only for 55% of the optimal Zn- necessity of organism. Disbalance of Zn-offer during last two pasture months reflected negatively the Zn-status of sheep. Deficit extend and organism reaction were determined by analyses of liver, rib bone and wool.

A comparative evaluation between Zn-level in non-irrigated and in anthropogen polluted flora from riverside pastures in Panagjurishte region was done. The increased background in meadow grass in August reached 89-103 mg/kg, that exceeded five times concentrations for non-irrigated grass.

## **CHEMICAL COMPOSITION AND NUTRITIVE VALUE OF JERUSALEM ARTISHOKE**

M. Ignatova, Z. Schindarska, M. Krasteva, J. Naydenova, A. Kirilov  
Plant Science (Bg), (2007), 44(5):461-464

The chemical composition and nutritive value of different parts of the Jerusalem artishoke (*Heliantus tuberosus*) during the vegetation phases is determined. It was established a high content of dry matter in the whole plant in the mounts September and October, low content of crude fibers in the tubers and high in vitro digestibility of their dry matter. The content of crude protein in the different parts of plant changes from 8.0% to 19.04% and is biggest in the leaf mass. The chemical composition and the nutritive value of Jerusalem artishoke make it a suitable forage both in fresh and conservative condition for livestock and poultry.

## **EFFECT OF THE PROBIOTIC ENTEROSAN AND ORGANOMINERAL CROMISAN ON SIMMENTAL CALVES PRODUCTIVITY DURING THE SUCKLING PERIOD**

*Z. Shindarska, K. Tsocheva, M. Ignatova, P. Stojkov, I. Yanchev, D. Girginov*

Animal Science (Bg), (2008), 2:11-18.

An experiment was carried out for determination of the effect of the probiotic Enterosan and the organic chrome-containing preparation Cromisan on the live weight, forage utilization and forage consumption of male calves of the Bulgarian Simmental breed during the suckling period. The calves were distributed in three groups - 6 calves per group – control one, 1st experimental one which received the probiotic Enterosan and 2nd experimental one which received the organomineral preparation Cromisan. The significant differences between the groups for the studied traits were determined by the method of analysis of variance. Predlagam tova izrechenie da otpadne GD. It was found that the adding of the probiotic Enterosan and the organomineral preparation Cromisan did not affect significantly the live weight of the calves during the suckling period. The addition of the probiotic Enterosan during the suckling period of the studied calves affected significantly the utilization of the forage and the consumed nutrients and energy. Significant differences exist for the consumption and forage utilization between the experimental groups.

## **EFFECT OF BETAIN ON THE GROWTH PERFORMANCE AND CARCASS TRAITS OF PIGS FROM THE DANUBE WHITE BREED**

*V. Vasileva, T. Popova, M. Ignatova, P. Marinova*

Animal Science (Bg), (2008), 3:55-59.

The experiment was carried out with two groups of pigs- control and experimental (5 animals each), from the Danube White breed. The diet of the animals from the experimental group was supplemented for 28 days with betaine (0.1 % of concentrate /wet weight). The aim of this study was to analyze the effect of the betaine on the performance and some carcass traits of the pigs. The results obtained showed that the dietary level of betaine led to higher average daily gain in the pigs from the experimental group. Betaine had a significant effect on the backfat thickness in the five anatomical locations. The changes in the backfat thickness and the thickness of m.LD, induced by betaine supplementation, as components for the calculation of the lean meat percentage did not increase this trait.

## **EFFECT OF INCLUSION OF RAPE EXPELLER IN THE RATION OF FEMALE LAMBS**

*F. Iliev, L. Kozelov, M. Ignatova*

Animal Science (Bg), (2008), 6:12-15.

A research production experiment was carried out with 20 female lambs of the Bulgarian synthetic dairy sheep population divided analogously into two groups. The control group received grass hay ad libitum and concentrate mixture consisting of: maize – 21%, barley – 47%, sunflower expeller – 5%, and rape expeller – 26%. In this group 85% of the sunflower expeller was replaced with rape expeller. For the 93-day experimental period the lambs of the control group gave higher average daily gain – 190 g vs. 174 g for the control group which received rape expeller.

## **THE EFFECT OF ENTEROSAN PROBIOTIC ON THE PRODUCTIVE INDEXES BY CALVES OF THE SIMENTAL BREED**

*P. Stoikov, Z. Shindarska, M. Ignatova, K. Boichev, I. Yanchev, D. Girginov*

Agricultural Science (Bg), (2008), 2:36-41.

A research on establishing the effect of the supplement of the enterosan probiotic on calves from the Simental breed has been done. The doses and the scheme of applying are a recommendation of the producer. It has been established that the supplement of enterosan after wean does not affect the investigated parameters - weight growth, consumption and utilization of the fodder. A reliable influence by the probiotic applying before and after wean has not been registered in comparison to the control group concerning the middle daily growth, animal weight and the affiliated nutrients but a proved ( $P < 0.01$ ) better utilization of the affiliated fodder, energy and raw protein (RP) ( $P < 0.01$ ) by the test group has been observed. The analysis of the intermediate in the organized dispersion complex indicates a reliable effect from the supplement of enterosan from the birth concerning the utilization of energy ( $P < 0.01$ ), fodder ( $P < 0.05$ ) and RP ( $P < 0.05$ ).

## **EFFECT OF THE PLANT EXTRACT VEMO HERB ADDITIVE ON THE RATION OF THE SUCKLING CALVES**

*P. Stoikov, F. Iliev, M. Ignatova*

Animal Science (Bg), (2009), 3:11-14.

An experiment was carried out with 16 eight-year-old suckling calves of the Bulgarian Simmental breed divided into two groups. The control group

received 4 kg milk per calve daily, concentrate mixture and alfalfa hey ad libitum. The control group animals received the same forages, but with the additive of 300 mg dry plant extract mixture of *Cichoria intibus*, *Cotinus coggyria* and *Tanacetum vulgare*. For the 62-day experimental period the experimental group calves received on average more concentrate mixture and alfalfa hey daily –  $P < 0.01$  and gave higher average daily gain ( $P < 0.0$ ) – 687.42 g compared to 570.48 g for the control group which led to lower energy and protein expenditure for one kg gain.

## **EFFECT O F THE PLANT EXTRACT VEMO HERB ON THE WEIGHT GAIN OF SUCKLING CALVES**

*P. Stoykov, F. Iliev, M. Ignatova, L. Kozelov*

Animal Science (Bg), (2010), 1:22-25.

Twelve suckling Simental calves at the age of 8 days were allocated into two groups. The control calves were fed on 4 kg milk per head daily, concentrate mixture and alfalfa hay ad libitum. The experimental animals were fed on the same ration but milk was supplemented with a mixture of dry plant extract of *Cichoria intybus*, *Cotinus coggygia* and *Tanacetum vulgare* at a dose of 500 mg per head daily.

During the 62-day-long experimental period the experimental calves had a slightly higher average daily intake of dry matter, concentrate mixture and alfalfa hay ( $P > 0.05$ ) and a higher daily weight gain ( $P > 0.05$ ) than the control calves - 629.42 g versus 516.48 g respectively, which resulted in lower energy and protein expen ses per kg of weight gain.

## **EFFECT FROM THE ADDITION OF XTRACT ON PRODUCTIVITY, MORPHOLOGICAL AND INCUBATION CHARACTERISTICS OF EGGS**

*D. Chotinski, M. Ignatova, E. Petkov*

Animal Science (Bg), (2011), 4:45-50.

An experiment was performed with 320 laying hens from Hy Line breed, divided into two groups: control group and experimental group. The laying hens in the control group received a feed mix with no supplement and the experimental group was fed with the addition of 0.2% XTRACT. It was determined that the addition of XTRACT in the feed mix: increases egg production by 7.0%, decreases the feed cost per 1 egg by 2.7% and increases egg weight by 0.89 g. Including XTRACT in the feed mix induces some changes in the morfological characteristics of the eggs: decreases yolk index and albumen index, but increases the weight and thickness of eggshell. The addition of XTRACT also increases by 10.3% the hatchability

of fertile eggs and by 8% the number of chicks hatched from eggs set in incubator.

## **EFFECT OF XTRACT ON MEMBRANE DIGESTION OF NUTRIENTS IN THE SMALL INTESTINE OF HENS**

*D. Chotinski, E. Toncheva, M. Ignatova*

Animal Science (Bg), (2012), 5:3-11.

The experiment was carried out with 320 laying hens from Hy Line breed, divided into two groups : control group and experimental group. The laying hens in the control group received mixture without the additive and these of the experimental group the mixture with the addition of 0.02 % XTRACT. Inclusion of XTRACT in the diets showed a tendency to increase maltase and leucine aminopeptidase and insignificantly decrease of alkaline phosphatase and sucrase in the mucose of small intestine of laying hens. The addition of XTRACT in the diets considerably increased  $\alpha$ -amylase, leucine aminopeptidase and aspartateaminotransferase activities in the blood plasma and decreased not significantly alkaline phosphatase, lipase and alanine aminotransferase activities in the blood plasma of laying hens. Supplementation of XTRACT in the diet did not cause considerable changes in the level of protein, glucose and trygliceride and showed a tendency to decrease the level of total cholesterol, HDL-cholesterol and LDL- cholesterol in the blood plasma of laying hens.

## **COMPARATIVE STUDY ON SOME CHEMICAL AND BIOCHEMICAL TRAITS OF BREAST MUSCLE IN THREE GENOTYPE BIRDS**

*E. Petkov, M. Ignatova*

Animal Science (Bg), (2014), 1-2:40-45

The experiment was carried out with male birds from three genotypes (100/ group): fast-growing Cobb; slow-growing synthetic line RB and layer type Lohmann-Brown Classic (LBC). The birds were reared under intensive system and fed *ad libitum* a diet containing 3.050 kcal/kg energy and 23.19 % crude protein. The experiment was finished when birds reached live weigh of approximately 1. 400 kg. At this weight six birds from each genotype group were slaughtered, the carcasses were cooled for 24h, further subjected to dissection and analyses for moisture, protein, fat, ash and cholesterol which were carried out on breast muscles.

No significant differences concerning the moisture and protein in breast were found between line RB and the other genotypes, as well as between the LBC hybrids compared to both other groups. The Cobb hybrids

displayed higher cholesterol and lower ash content compared to RB ( $P<0.05$ ), while in comparison to LBC, the birds had higher content of moisture ( $P<0.05$ ) and lower content of protein ( $P<0.001$ ). The lowest content of cholesterol from all three genotypes was found for LBC birds ( $P<0.001$ ), while the Cobb hybrid had the highest lipids content, followed by line RB and hybrid LBC ( $P<0.001$ ).

## **CORN DISTILLERS DRIED GRAINS WITH SOLUBLES AS FEED INGREDIENT FOR BROILER CHICKENS**

*M. Todorova, M. Ignatova, E. Petkov*

Animal Science (Bg), (2014), 1-2:66-72

An experiment was conducted with 300 male one-day old broiler chickens. The birds were allocated to three experimental groups. Two stage feeding system was applied – with starter and finisher mixture. The control group received standard compound feed. The first experimental group received diet contained 15% dried distillers grains with soluble from corn (DDGSc). The second experimental group received diet contained for the starter period 15% DDGSc and for the finisher period – 30% DDGSc. DDGSc inclusion at level up to 15 or 30% did not affect broiler growth performance. Inclusion of 30% DDGSc in compound feeds resulted in significant increase in amount of abdominal fat by 21.4%. DDGSc did not affect other carcass parameters. In both experimental groups total serum cholesterol was significant decrease (by 12.5% for the first experimental group and by 13.2% for the second experimental group, respectively).

## **TESTING THE EFFECT OF PROBIOTIC LACTINA IN FEEDING CALVES**

*M. Ignatova, Z. Shindarska, Y. Iliev*

Animal Science (Bg), (2015), 4:11-16

In order to test the effect of probiotic Lactina is held with calves of Simmental breed in suckling period. It is established final live weight (with 5.6%) and average daily gain in calves receiving probiotic, the values are more pronounced until the 30<sup>th</sup> day of the experiment. There is also a higher consumption (with 4.6%) expense of the starter mixture and hay. The results of microbiological studies of faces showed a decline in the total number of microorganisms (with 12.3%) and the number of coli-forms (with 42.6%) in the experimental group compared with the control one. It is established reducing digestive disorders in calves receiving probiotic Lactina with the milk replacer.

## **EFFECT OF SUPPLEMENTAL CHROMIUM ON SOME BLOOD CONSTITUENTS IN CALVES**

*I. Yanchev, D. Gudev, S. Popova-Ralcheva, P. Moneva, Z. Shindarska, M. Ignatova, P. Stoikov*

Доклады Четвертая Международная конференция „Актуальные проблемы биологии в животноводстве”, Боровск, 2007. 153-158.

The study was designed to investigate the effect of chromium picolinate given during the milk period on some blood metabolites in calves, measured immediately after weaning.

Supplemental chromium picolinate decreased plasma cholesterol ( $P<0.05$ ) and cortisol ( $P<0.05$ ) levels, but had no effect on plasma indol, glucose and urea levels after weaning of the calves.

## **EFFECT OF ESSENTIAL OIL ADDITION IN RABBITS DIETS**

*M. Ignatova*

Proc. Ukrainian-Hungarian Days for the Extending of the Bilateral Cooperation, 3rd - 4th November, 2009, Uzhhorod, Ukraine, 56-59.

A 45<sup>th</sup> experiment was conducted to study the effect of essential oil supplementation to the diet on growth performance, feed efficiency and carcass characteristics of fattening New Zealand White rabbits. There were two treatment groups: one without supplement and the other with 0.03% essential oil of *Thymus vulgaris*. The body weight gain, feed intake and utilization, carcass characteristic and meat quality were determined.

Essential oil supplementation has positive effect on final body weight by 2.5% and on growth rate by 5.0%. Essential oil addition increased feed intake by 7.1% and improved meat quality. No differences in feed efficiency and dressing percentage were observed.

## **INVESTIGATION OF THE EFFECT OF CITRUS FENNEL AROMA ON PRODUCTION, USE OF NUTRITIOUS SUBSTANCES AND SLAUGHTER RESULTS IN FATTENING CHICKENS**

*M. Saftic, B. Zivkovic, D. Chotinski, D. Belorechkov, M. Ignatova*

1<sup>st</sup> workshop Feed-to-Food; XIII Symposium Feed Technology, Proceedings, pp.136-145., Sept. 29<sup>th</sup> – Oct. 1<sup>st</sup>, 2009, Novi Sad.

The effects of addition of aroma Citrus Fennel in the nutrition of fattening chickens were studied. Obtained results showed that positive effects of use of investigated aroma are reflected in increase of body mass of chickens by 5.5%, increase of daily gain by 5.72%, increase of feed intake by 2.4%, improvement of feed conversion ratio by 3.1%. Addition of investigated

aroma had no significant effect on protein and energy balance in chicken organism. Amount of abdominal fat decreased by 15.5% by adding of Citrus Fennel aroma to mixture for the chickens.

In general, obtained results showed that by introduction of aroma Citrus Fennel a positive effects in the nutrition of fattening chickens were realized.

## **EFFECT OF SUPPLEMENTATION OF TRIBULUS TERRESTRIS L.-EXTRACT IN STANDARD DIET FOR WEANED PIGS ON GROWTH PERFORMANCE AND BLOOD CHOLESTEROL LEVEL**

*M. Ignatova, M. Todorova*

Материалы XIV международной научно-практической конференции „Аграрная наука – сельскохозяйственному производству Сибири, Монголии, Казахстана и Болгарии”, 2011, часть 2:3-5.

The study was carry out to determine the growth promoting ability of dry extract of Tribulus retestris L. in weaning pigs and the effect on total serum cholesterol. The results of the experiment have shown that diet supplementation of dry extract of Tribulus retestris L. at level 5 mg/kg had positive effect on body weight by 14.6%. The addition of herb improved feed conversion rate by 21.9%. Average daily gain increased in treatment group by 28,5% ( $P < 0.05$ ). The extract supplementation reduced total serum cholesterol by 2.9%.

## **EFFECT OF PROBIOTIC SUPPLEMENTATION ON PRODUCTIVE CHARACTERISTICS AND HEALTH OF PIGLETS**

*M. Ignatova, M. Todorova*

Collection of works of Scientific symposium with international participation dedicated to 55th anniversary of the founding of the Institute „Achievements and perspectives in animal husbandry, biotechnology and veterinary medicine”, 6-8 october, Moldova, Maximovca – 2011, pp 163-166

A study was conducted to evaluate the effect of supplemental probiotic in sows and piglet diets on performance, litter size and health status. Twenty four sows were allocated into four groups and fed diets supplemented or not supplemented with mixture of probiotic strains. The mixture consisted of freeze-dried cultures of *Lactobacillus acidophilus*, *Lactobacillus helveticus*, *Lactobacillus bulgaricus*, *Lactobacillus lactis*, *Streptococcus thermophilus* and *Enterococcus faecium*. The trail continued from the 85<sup>th</sup> day of pregnancy till the weaning of piglets at 35<sup>th</sup> day of age. Diets of supplemented groups contain 500 g/ton probiotic for pregnant or lactating sows and 800 g/ton for suckling pigs. No significant differences were observed in number of the live born piglets or in number of weaned piglets among treatments. Piglets from the experimental group had higher live

weight at weaning compared to control . In group where sows and piglets were fed with probiotic weaned piglets had higher live weight compared to the group where only piglets were supplemented and to the control group. No significant difference was observed in feed intake among treatments during the suckling period. Somatic cells content was lower in group of supplemented sows. Trail group had healthier mammary gland.

## **CHEMICAL COMPOSITION OF MULTIFLORAL BEE POLLEN FROM BULGARIA**

*R. Balkanska, M. Ignatova*

6th Central European Congress on Food, CEFood 2012; 375 – 377

Bee pollen is promoted as a healthy food with a wide range of nutritional and therapeutic properties. The objective of the present study is to determine the chemical composition of multi-floral bee pollen produced in Bulgaria. The study was carried out totally on fourteen bee pollen samples. The following parameters were determined: moisture content, proteins, lipids, ash. Ten commercial bee pollen samples were purchased from the market. It was found that the bee pollen contains: moisture (8.98-14.60%), proteins (22.05-25.96%), lipids (3.81-9.32%), ash (2.30-2.80%). Four samples come from the experimental apiaries of Institute of Animal Science (IAS)-Kostinbrod. For these samples the following results were obtained: moisture (11.39-16.48%), proteins (18.45-22.42%), lipids (6.30-8.71%), ash (1.56-2.22%). The average values of moisture ( $13.81 \pm 1.06\%$ ), proteins ( $19.80 \pm 0.89\%$ ), lipids ( $7.15 \pm 0.54\%$ ) and ash content ( $1.81 \pm 0.14\%$ ) of bee pollen samples collected at IAS are comparable with those of commercial samples –  $11.51 \pm 0.55\%$ ;  $23.48 \pm 0.44\%$ ;  $6.38 \pm 0.54\%$ ;  $2.58 \pm 0.06\%$ , respectively. The variation between the samples can be explained by multi-floral origin.

## **EFFECT OF FEEDING WHEAT DDGS TO WEANED PIGS ON PERFORMANCE AND BLOOD SERUM CHOLESTEROL**

*M. Ignatova, M. Todorova*

Матеріали міжнародної науково-практичної конференції “Розведення та селекція сільськогосподарських тварин: історичний досвід, сучасне, майбутнє”, 2012, . 360-362

The objective of this experiment was to study the effect of inclusion of 20% wheat dried distillers grain with soluble in diet on weaned pig performance and blood cholesterol concentration.

Twenty six weaned cross-breed pigs (initial body weight  $13.8 \pm 0.06$  kg) with two replicates were randomly allocated to two experimental groups for six

weeks. The experimental design consisted of two dietary treatments:

1) control diet – standard compound feed;

2) experimental diet – with wheat DDGS at a level of 20% in the diet. Individual pigs' body weights were recorded every second week. Feed intake and feed conversion rate were determined every second week per group. At the end of the experiment blood samples were collected from the pigs to determine total serum cholesterol concentration.

The results of this study have shown that the inclusion of 20% wheat DDGS in diet for weaned pigs improved average daily gain by 7.6%. Feed conversion rate was improved by 9.6%. The experimental group has increased serum cholesterol by 29.3%.

## **EFFECT OF DIETARY PROBIOTIC ON EGG QUALITY**

*M. Ignatova, V. Sredkova, E. Petkov, M. Todorova*

Proceedings of the 10th International Symposium Modern Trends in Livestock Production, October 2-4. 2013. Beograd, Serbia. 835-840

The aim of this experiment was to investigate the effect of supplemental probiotic in laying hens diet on morphological parameters, egg quality and yolk cholesterol concentration. The probiotic containing *Enterococcus faecium* ( $5 \times 10^{12}$  CFU) was added to the diet at quantity of 200 g/t. In this study, were used two egg type lines birds (L and HL) from gene pool flock of the experimental poultry farm of Institute of Animal Science – Kostinbrod. The hens of each egg type line were randomly allocated to two groups – control and experimental. The hens of the control groups received standard compound feed without added supplement. The hens of the experimental groups were fed with standard compound feed supplemented with probiotic. Egg weight and egg albumen were significantly higher for the experimental group HL ( $P < 0.01$ ;  $P < 0.001$ ), while for the experimental group L these parameters were not affected by treatment. The Haugh unit was significantly improved for both experimental groups ( $P < 0.01$ ) compared to the controls, but egg shell qualities were not affected.

The results showed that in groups received probiotic the intensity of yolk color was increased. Yolk cholesterol concentration in eggs was reduced for the experimental groups compared to the control groups.

## **STUDY ON FECUNDITY OF HYBRID SOWS**

*N. Metodiev, S. Gochev, M. Ignatova*

Proceedings of the 10th International Symposium Modern Trends in Livestock Production, October 2-4. 2013. Beograd, Serbia. 682-689.

The aim of the study was to establish the effect of the parity of the PIC sows on the following indices: total litter size, size of live born, size of dead born piglets and size of mummified fetuses. 2090 farrows were studied, as they varied between 1st to 9<sup>th</sup> ( n = I - 479 , II – 424, III - 334, IV - 369, V -217, VI - 152, VII - 112, VIII – 72 and XI – 31). The estimation of the parity was done by One –way ANOVA through statistical program SPSS 13.0. The significance of the studied factor was determined by values of F – criteria. When the factor influenced significantly, Post Hoc Test and LSD analysis were done to determine the significance of the differences between parities by t – test of Student. The obtained values of F-criteria showed, that the consecutiveness of parity influenced total litter size (F = 9.96, P<0.001), size of live born ( F = 4.47 P<0.001), size of dead born (F = 29.07, P<0.001) piglets and mummified fetuses (F = 3.36, P<0.001). The highest total litter size had V – and VI- parity (15.16 and 15.20 respectively). The great number of live born piglets had parity V – at the average of 13.58 piglets, as the similar number had parities III and VI 13.51 and 13.56 respectively). From the obtained results about effect of parity, we could conclude that the effective reproductive use of hybrid PIC sows is up to parity VI inclusive.

## **COMPARISON OF PHYSICOCHEMICAL PARAMETERS IN ROYAL JELLY FROM ROMANIA AND BULGARIA**

*R. Balkanska, L. Al. Mărghitaș, C. I. Pavel, M. Ignatova, L. Tomoș*

Bulletin UASVM Cluj-Napoca Anim Sci Biotechnol 2013;70:117-21

Royal jelly is a highly active natural biological substance secreted from the hypopharyngeal and mandibular glands of young worker honeybees (*Apis mellifera*). The main quality parameters of royal jelly composition are water, proteins, carbohydrates, lipids, 10-hydroxy-2-decenoic acid, ash, pH and acidity. The aim of this study is to compare physicochemical parameters in royal jelly samples from Romania and Bulgaria in order to assess whether there are any differences between the samples from the both countries. The following parameters: proteins by Folin-Ciocalteu reagent; sugars (fructose, glucose, sucrose) by HPLC; water by refractometer and direct drying; total acidity by titration with 0.1 N NaOH and pH–potentiometrically were measured in 35 Bulgarian and 34 Romanian royal jelly samples collected from different regions of both countries. The values obtained for parameters in samples from Romania are as follow: water  $62.50 \pm 3.52$  %, proteins  $13.04 \pm 1.87$  %, fructose  $5.39 \pm 1.12$  %, glucose  $5.41 \pm 1.45$  %, sucrose  $1.19 \pm 0.67$  %, pH  $3.99 \pm 0.09$  and total acidity  $3.78 \pm 0.53$  ml 0.1 N NaOH/g). The samples from Bulgaria gave the following results: water  $62.13 \pm 1.90$  %), proteins  $15.83 \pm 2.58$  %, fructose  $4.84 \pm 0.81$  %, glucose  $4.51 \pm$  %, sucrose  $1.92 \pm 1.21$  %, pH  $3.85 \pm 0.18$  and total acidity  $3.90 \pm 1.42$  ml

0.1 N NaOH/g). Higher levels of protein and sucrose and lower levels of fructose content were found in Bulgarian royal jelly. Differences in climate between the two countries, even if they are small, and the intrinsic heterogeneity of royal jelly influence the composition of the product.

## **EFFECT OF FEEDING RAPESEED MEAL TO WEANED PIGS ON PERFORMANCE AND TOTAL SERUM CHOLESTEROL CONCENTRATION**

*M. Todorova, M. Ignatova*

Proceedings of the 10th International Symposium Modern Trends in Livestock Production, October 2-4. 2013. Beograd, Serbia. 690-696

The experiment was conducted to evaluate the effect of use of rapeseed meal instead of soybean meal in weaned pigs diet on performance and total serum cholesterol concentration. Thirty weaned pigs cross-breed Youna (initial body weight  $14.06 \pm 0.24$  kg) with two replicates were randomly allocated to two experimental groups for six weeks. The experimental design consisted of two dietary treatments. The diet used as control was standard compound feed based on corn and soybean meal. The experimental diet contained 7.5 % rapeseed meal. The diets were formulated to be isoenergetic and isonitrogenous. During the experiment pigs had ad libitum access to feed and water. Individual pigs body weights were measured initially and on day 14, 28, and 42 of experiment. Feed intake and feed conversion ratio of the subgroups were determined every 14th day. At the end of the experiment blood samples were collected from the pigs to determine total serum cholesterol concentrations. Inclusion of 7.5% rapeseed meal in the diet of weaned pigs tended to have negative effect on the performance. Average daily gain was decreased by 5.7%. Average daily feed intake was increase by 3.4 %. Feed conversion ratio was worsening by 20.6 %. Feeding rapeseed meal decreased total serum cholesterol concentration by 5.1 %.

## **PHYSICOCHEMICAL PARAMETERS OF BULGARIAN RAPE HONEY (*BRASSICA SPP.*) AND CORIANDER HONEY (*CORIANDRUM SATIVUM L.*)**

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Honey has been essentially used as a food all over the world since ancient times. Honey contains sugars, organic acids, enzymes, amino acids, mineral elements, pollen. The composition of honey varies greatly depending on the

honey floral source. The purpose of this study was to verify and compare some physicochemical parameters of rape honey (*Brassica* spp.) and coriander honey (*Coriandrum sativum* L.) samples collected from Bulgaria and to increase the data for these unifloral honey types. Seven rape honey samples and six coriander honey samples were analyzed. The quality criteria of honey are specified by the International Honey Commission (IHC) and physicochemical parameters such as colour, water content, electrical conductivity, pH, free acidity, specific rotation, diastase activity and hydroxymethylfurfural (HMF) were determined in this study. The values obtained from rape honey samples were in the range: water content 15.60 – 18.40%, electrical conductivity 0.16 – 0.27 mS/cm, pH 3.75 – 4.15, free acidity 13.23 – 16.17 meq/kg. For coriander honey samples the following values were defined: water content 15.60 – 17.00%, electrical conductivity 0.37 – 0.58 mS/cm, pH 3.70 – 4.25, free acidity 14.70 – 19.60 meq/kg. The specific rotation in both honey types was negative. Colour, diastase activity and HMF were also discussed.

## **BEHAVIOURAL REACTIONS IN CALVES RECEIVING FERMENTED MILK PRODUCTS CONTAINING LACTOBACILLUS CASEI 169**

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Сборник научных докладов XVI Международной научно-практической конференции „Аграрная наука – сельскохозяйственному производству Монголии, Сибирского региона, Казахстана и Болгарии”, часть II, 98-101.

The aim of the study is to investigate the behavioural reactions in Bulgarian Simmental suckling calves, receiving milk products containing lactic acid bacteria with low acidity. It was found that during the monitoring, the key behaviour reactions in the calves will be distributed as follows: feeding - 8.98% (64.66 min) for the first experimental group and 7.90 % (56.88 min) for the control group, lying: 63.90% (460.08 min) and 61.85% (445.32min), standing - 26.20 % ( 188.64min) and 29.13% (209.74 min), and motion 0.92% (6.62 min) and 1.12% (8.06 min), respectively for the experimental and control groups. No significant differences between the studied groups were found.

## **OXIDATIVE STABILITY OF LIPIDS AND PROTEINS IN COOKED HAM DURING REFRIGERATED STORAGE AS AFFECTED BY DIETARY VITAMIN E SUPPLEMENTATION IN PIGS**

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Materials IV International Scientific and Practical Conference “Zootechnical Science: History, Problems and Prospects”, Podolsk, 2014, pp 382-384

The aim of the study was to examine the effect of vitamin E supplementation in the diet for pigs on the oxidative stability of lipids and proteins in cooked ham during refrigerated storage.

Based on the results of this study we may suggest that vitamin E supplementation in the diet of pigs in amount 400 mg/kg has positive effect for restriction of lipid and protein oxidation during processing of meat and further storage of meat products.

## **LIPID COMPOSITION OF MEAT IN MALE LAYER-TYPE CHICKENS AT DIFFERENT AGE**

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Proceedings of the 4th International Congress "New Perspectives and Challenges of Sustainable Livestock Production". 2015, pp 168-175

An experiment was carried out with male layer-type chickens at the age of 5 and 12 weeks to study the changes in the intramuscular lipid content, total cholesterol and fatty acid composition in breast and thigh. In both muscles the content of total lipids and cholesterol decreased as age increased, and the same was found for the levels of C14:0 and C16:1 ( $P < 0.001$ ). Breast muscle in the chickens slaughtered at 12 weeks of age displayed lower content of C18:2 ( $P < 0.001$ ), C20:3 ( $P < 0.01$ ) and MUFA ( $P < 0.05$ ), but higher of C16:0 ( $P < 0.05$ ); C20:4 ( $P < 0.001$ ), C22:5 ( $P < 0.001$ ), C22:6 ( $P < 0.05$ ) and the total amount of n-3 PUFA ( $P < 0.05$ ). In thigh muscles the older age led to lower levels of C18:0 ( $P < 0.05$ ), C18:3 ( $P < 0.001$ ) and C20:3 ( $P < 0.001$ ) while C20:4 and C22:5 increased significantly ( $P < 0.001$ ). No changes in the ratio PUFA/SFA in breast and thigh due to the age of the bird was found, however it remained higher than the recommended minimal values.

## **NUTRITIONAL QUALITY OF CHICKEN MEAT- COMPARISON BETWEEN WHITE AND RED MEAT IN MALE LAYER-TYPE CHICKENS**

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„Научное обеспечение животноводства Сибири”, Сборник научных статей Международной научно-практической интернет-конференции, 12-13 мая 2016 г., Красноярск, стр.58-62.

The study was carried out with male broiler chickens to provide information on the nutritional quality and compare the white (breast) and red (thigh) meat in these birds. Based on the results, breast meat in the male-layer type chickens has certain advantages compared to thighs, such as lower lipid and cholesterol while higher protein content. On the other hand, despite the higher n-6/n-3 ratio, and lower total polyunsaturated fatty acid content, high meat presents lower percentage of saturated fatty acids, higher monounsaturated fatty acids and P/S ratio.

## **EFFECT OF XTRACT ON THE MEMBRANE DIGESTION OF NUTRIENTS IN THE SMALL INTESTINE OF BROILER CHICKENS**

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Сборник "10 години факултет по ветеринарна медицина при ЛТУ (1994-2004)", стр. 83-89

The XTRACT is a standardized mixture, containing carvacrol from Oregano, cinnamaldehyde from cinnamon and capsaicin from pepper. The aim of this study was to determine the effect of the XTRACT supplementation in the diet on the number of enzymes localized in the enterocyte microvillous membranes, isolated from the jejunum of broiler chickens.

It has been established that the XTRACT supplementation upon the diet in which corn has been replaced by oats as the only energetic source and 0.1%  $\beta$ -glucanase increased significantly leucine aminopeptidase activity ( $P < 0.05$ ) and decreased the activities of maltase and sucrose in the enterocyte microvillous membrane ( $P < 0.01$ ) compared with the control group.

It was observed increased protein retention and decrease fat retention in the chickens carcasses after XTRACT supplementation.

The data showed that the feed additive investigated had considerable effect on membrane digestion of feed in the small intestine and beneficial effect on the chicken performance.

## **POSSIBILITIES FOR USE EXTRUDED SOYBEAN AND AMYLIPROTEX IN FEEDING OF BROILER CHICKENS**

*D. Chotinski, M. Ignatova, L. Kozelov*

Сборник материали от Юбилейна научна конференция "Селекционни и технологични аспекти при производството и преработката на соя и други бобови култури", 08.09.2005 г., гр.Павликени, стр. 181-192

The objective of the study was to determine the possibility for partial and complete replacement of soybean oil meal in the ration for broiler chicken by extruded full-oil soybean and Amiliprotex. Results of trials with broiler chicken divided into 6 groups and application of three-stage system of feeding with starter, grower and finisher mixture were used. It was found that:

The live weight of the broiler chicken increased by 1.4 and 2.9% when replacing the soybean oil meal in the combined feed by extruded full-oil and medium-oil soybean. When including Amiloprotex in the ration during the starter period the live weight of the broiler chicken in the fourth and sixth group increased by 3.5 and 1.6% and the feed consumption decreased by 1.0 and 2.6%. The percentage of broiler and grill increased by 1 to 2

points when replacing soybean oil meal by extruded full-oil soybean, medium-oil soybean and Amiloprotex.

## **EFFECT OF PROBIOTIC ENTEROSAN ON SOME BIOCHEMICAL PARAMETERS AND FACTORS OF IMMUNE RESISTANCE IN SIMMENTAL CALVES**

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Сборник доклади от научната конференция „Традиции и съвременност във ветеринарната медицина”, ЛТУ, София. стр. 139-145.

The application of probiotic ENTEROSAN in suckling calves contributes to the improvement of the physiological condition and biochemical profile of the blood serum as well as to increase of the nonspecific resistance. Serum globulins, urea and creatinine in the calves receiving the probiotic changed significantly when compared to the control animals. The addition of the probiotic did not induce significant decrease in the total cholesterol and alkaline phosphatase in the serum. The results showed positive effect of the probiotic microorganisms on the concentration of IgG and the lysozyme activity in the serum in the treated animals.