РЕЗЮМЕТА НА ПРЕДСТАВЕНИТЕ В ПЪЛЕН ТЕКСТ НАУЧНИ ТРУДОВЕ

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СЛЕД ЗАЩИТА НА ДОКТОРСКА ДИСЕРТАЦИЯ

В списания с IF (9):

1. **Vachkova, E. G.**, I. Penchev Georgiev, B. L. Bivolarski, R. Konakchieva**,** 2010. Relationships between plasma concentrations of Epidermal Growth Factor, insulin and iodated thyroid hormones in early and normal weaned rabbits. Revue Méd. Vét., 2010, 161, 1, 30-36. **(IF=0.175/2010)**

SUMMARY

As the iodated thyroid hormones, insulin as well as the somatotropin-IGF axis and EGF are the main regulators of growth and development in neonate, the purpose of this study was to investigate the relationships between EGF, insulin and thyroid hormones in early and normal weaning rabbits and their effects on body mass accumulation. A total of fifty clinically healthy New Zealand white rabbit puppies were divided into 2 equal groups depending on the weaning age: in the group A, puppies were weaned when they were 21 days old, whereas rabbits of the group B were weaned at 35 days of life. Body weights and plasma hormone (insulin, TT3 and TT4) and EGF concentrations were measured in 5 animals per group on the weaning day (day 0), 7, 14 and 21 days after weaning and when animals were 95 days old. The body weights for the experimental period and at the final time point were significantly lowered in the early weaned rabbits compared to controls.

Furthermore, while the body weight gains were maximal during the first week after weaning, then decreased and remained constant in controls, the growth was delayed in early weaned rabbits, the highest body weight gains being obtained between the 14th and the 21st days post weaning. The mean plasma hormone concentrations except those of TT4 were significantly lower in the early weaned rabbits (group A) than in the normal weaned controls (group B): while insulin and TT3 concentrations gradually increased in controls, they remained stable and low in the group A although insulin concentrations were significantly enhanced compared to initial values and closely related to control values when animals were 95 days old. The variations of the EGF concentrations according to time were similar in both groups but, this

parameter was significantly depressed in early weaned rabbits on days 0 and 21 post weaning as well as at the final time point compared to controls. Body weights, insulin and EGF concentrations were significantly correlated in the both 2 groups, and body weight and TT3 were positively associated only in the group A. By contrast, the plasma T4 concentrations were markedly elevated in early weaned puppies on day 0 then they have gradually decreased while they have remained constant in controls.

Consequently, plasma TT3 and TT4 concentrations were highly positively associated only in the controls and a significant negative correlation was evidenced between body weight and TT4 in the group A. These results clearly indicate that EGF acts also as an endocrine factor and that the early weaning negatively affects growth in rabbits by interfering with endocrine secretion, and particularly with the thyroid function.

Keywords: Rabbits, Weaning, EGF, Insulin, Iodated thyroid hormones, Growth

2. Georgiev, I.P., T. M. Georgieva, V. I. Ivanov, S.Dimitrova, I. Kanelov, T.Vlaykova, S. Tanev, D. Zaprianova, E. Dishlianova, G. Penchev, L. Lazarov, **E. Vachkova**, A. Roussenov, 2011. Effects of castration-induced visceral obesity and antioxidant treatment on lipid profile and insulin sensitivity in New Zealand White Rabbit. *Research in Veterinary Science*, 2011, **90,** 196–204**. (IF=1.649/2011)**.

ABSTRACT

Molecular mechanisms, responsible for the impaired insulin-sensitivity state due to the obesity are not fully understood in both humans and animals. The purpose of this study was to investigate the effects of castration-induced visceral obesity and the influence of two antioxidants on constituents of blood lipid profile and insulin sensitivity in New Zealand white rabbits. Twenty-six clinically healthy male New Zealand white rabbits were used in the experiment and were divided into 3 groups: first group (CI, n = 7) – castrated-obese and treated with antioxidants „Immunoprotect" for 2 months; second group (CO, n = 7) – castrated-obese; third group (NC, n = 12) – control group (non-castrated, non-obese). At the end of the follow-up period of 2 months after castration an intravenous glucose tolerance test (IVGTT) was performed after a 12-h fasting period as the blood samples for determination of glucose and insulin and their kinetic parameters were obtained at 5 and 0 min before and at 5, 10, 30, 60 and 120 min after the infusion of the glucose. The constituents of lipid profile, triglycerides (TG), total cholesterol (TC) and HDLcholesterol (HDL-C) were also assessed in the overnight fasting blood samples. The body weight (BW), body mass index (BMI), amount of the visceral fat (VF)

and VF/BW ratio were both measured and calculated before the IVGTT and at the end of the experimental period. All measured markers of obesity (BW, BMI, VF, VF/BW) were significantly higher in both groups of castrated rabbits than in the control group. Apart HDL-C, the plasma concentrations of all constituents of lipid profile (TG, TC, HDL-C) were the highest in CO group. There were generally no differences between CI and NC groups for the same traits. After glucose injection blood glucose concentrations and glucose and insulin kinetic parameters were considerably higher (except of glucose elimination rate) in CO rabbits than in NC ones. Castrated rabbits treated with ‘‘Immunoprotect” showed lower fasting plasma insulin and improved glucose kinetics dynamics than CO rabbits, but commensurable values of glucose and insulin kinetics parameters than NC group. The results of the current study clearly indicated that castration-induced visceral obesity affected negatively the lipid profile and insulin sensitivity and/or responsiveness. Treatment with antioxidant supplementation, consisted of d-limonene and vitamin E, improved blood lipid profile, fatty liver, glucose homeostasis and insulin sensitivity in obese rabbits. In addition, based on our results we may suggest that castrated male New Zealand white rabbits might be considered as an appropriate animal model to study various metabolic abnormalities related to visceral obesity, such as dyslipidemia and impaired insulin sensitivity.

3. Bivolarski, B.L., **E. G. Vachkova,** S.S. Ribarski. 2011. Effect of weaning age upon the slaughter and physicochemical traits of rabbit meat. *Veterinarski Archive*, 81 (4), 499-511. **(IF=0.314/2011).**

ABSTRACT

The effect of the weaning age of rabbits on slaughter traits and physicochemical properties of meat was investigated. Sixteen New Zealand White rabbits (Oryctolagus cuniculus) were used, divided in two groups: group A (n = 8) - weaned at the age of 21 days (early weaned) and group B (n = 8) - weaned at the age of 35 days (normally weaned). The animals were fed with two categories of pelleted feed: for weaned rabbits up to 50 days of age and for growing rabbits older than 50 days of age. It was established that the early weaning of rabbits resulted in a statistically signififi cantly lower body mass, dressed carcass weight and dressing percentage as compared to normally weaned animals. Also, the pH of meat by the 24th hour after slaughtering and the dry matter of m. longissimus lumborum (LL) were signififi cantly lower in group A. Simultaneously, a statistically signififi cantly higher water-holding capacity, water content and lightness were established in the meat of early weaned compared to normally

weaned rabbits. The protein and fat contents of LL and m. semimembranosus (SM) in rabbits from group A correlated negatively and signififi cantly with water content, and positively with the dry matter. In group B, water content also correlated signififi cantly and negatively with protein content. Fat and ash in SM meat was in a positive statistically signififi cant relationship for both experimental groups. The results from the present study showed that the weaning age inflfl uenced both the slaughter traits and physicochemical properties of rabbit meat.

Key words: early weaned rabbits, body mass, dressing percentage, physicochemical properties, meat

4. **Vachkova, E.**, B. Bivolarski, M. Gulubova, R. Konakchieva, I. P. Georgiev, R. Simeonov, 2011. Immunohistochemical localization of EGF receptors in the intestinal tract of growing rabbits in relation to age. Livestock Science, Volume 142, Issue 1, pp 216-221. **(IF=1.506/2011).**

Summary

During postnatal development, the intestinal tract of newborns is exposed to morphological and functional alterations. Adaptive changes are being modulated to a great extent by biologically active substances secreted from milk, such as the epidermal growth factor (EGF). The aim of the present study was to establish by a comparative approach the distribution of receptors for EGF (EGFR and ErbB-1) expressed in epithelial cells lining the villi, crypts and serosa of the duodenum, ileum, caecum and colon of rabbits euthanised at the 21st (group A) and the 35th (group B) postnatal days. The intensity of immunohistochemical staining against EGFR on the villi surface in group A was higher than that of group B in the duodenum (2.8±0.11 vs. 2.0±0.17; Pb0.001), ileum (2.8± 0.13 vs. 2.0±0.21; Pb0.01) and colon (1.9±0.15 vs. 1.0±0.12; Pb0.05). In contrast, the luminal surface epithelial cells in the caecum of the 21-day rabbits had lower intensity of staining than in the 35-day ones (0.9±0.15 vs. 2.1±0.15; Pb0.001). The intensity of the immunohistochemical reaction on the surface of the villi in both groups lessened from the proximal to the distal part of the intestinal tract. The EGFR reaction occurred in a narrow range of intensities in the crypts of all investigated segments of the intestines (0.9–1.2). In general, the lowest (0.7±0.14) reaction was established in the serosa of the colon of 21-day-old animals. The age-dependent presence of EGFR observed indicated that this factor should be considered when defining the optimal weaning age of the rabbit.

5. Stark, A., **E. Vachkova**, O. Wellnitz, R. Bruckmaier, C. Baumrucker, 2012. Colostrogenesis: candidate genes for IgG1 transcytosis mechanisms in primary bovine mammary epithelial cells. *Journal of Animal Physiology and Animal Nutrition,* 97 (6), p. 1114–1124 (**IF= 1.254 /2012).**

Summary

Bovine colostrogenesis is distinguished by the specific transfer of IgG1 from the blood to mammary secretions. The process has been shown to be initiated by hormones and occurs during the last weeks of pregnancy when steroid concentrations of estradiol (E2) and progesterone (P4) are highly elevated. Rodent intestinal uptake of immunoglobulin G is mediated by a receptor termed Fc fragment of IgG, Receptor, Transporter, alpha (FcGRT) and supported by light chain Beta-2-Microglobulin (b2M). We hypothesized that steroid hormone treatments (E2 and P4) of bovine mammary epithelial cells in vitro would induce up-regulation of IgG1 transcytosis candidate gene mRNA expression suggesting involvement in IgG1 transcytosis. Two different primary bovine mammary epithelial cell cultures were cultured on plastic and rat tail collagen and treated with hormonal combinations (steroids/lactogenic hormones). Evaluated mRNA components were bLactoferrin (bLf: a control), bFcGRT, b2M, and various small GTPases; the latter components are reported to direct endosomal movements in eukaryotic cells. All tested transcytosis components showed strong expression of mRNA in the cells. Expression of bFcGRT, bRab25 and bRhoB were significantly up-regulated ($p < 0.05$) by steroid hormones. bRab25 and bRhoB showed increased expression by steroid treatments, but also with lactogenic hormones. Analysis for the oestrogen receptor (ER) mRNA was mostly negative, but 25% of the cultures tested exhibited weak expression, while the progesterone receptor (PR) mRNA was always detected. bRab25 and bRhoB and likely bFcGRT are potential candidate genes for IgG1 transcytosis in bovine mammary cells.

Keywords colostrum, mammary gland, transcytosis, IgG1, FcRn

6. Yonkova, P., A. Roussenov, D. Kanukov, D. Zapryanova, **E. Vachkova**, A. Serbest, R. Dimitrov, D. Kostov, 2012. Ultrasound imaging, biochemical blood analyses, and weight investigations of dissectible fat depots in New Zealand white rabbits. Turk. J. Vet. Anim. Sci.; 36(6): pp. 635-641. **(IF=0.221/2012).**

Abstract:

The purpose of the present study was to evaluate changes in real-time ultrasound imaging traits and weight of dissectible fat depots (inguinal, interscapular, and perirenal) in rabbits with diff erent body weights and to monitor the changes in blood glucose and constituents of lipid profi les. In this study, 18 clinically healthy male New Zealand white rabbits were used. Th e rabbits were fed with standard diet and were divided into 3 groups according to their body weight: group 1 at 1.06 ± 0.03 kg, group 2 at 2.1 ± 0.05 kg, and group 3 at 3.06 ± 0.03 kg. Examined by ultrasonography, the inguinal and interscapular fat depots appeared as bands with weak to moderate echogenicity, whereas perirenal fat was moderate to hyperechoic. Th e thickness of subcutaneous fat depots measured by ultrasound increased along with body weight and diff erences between the groups were found to be statistically signifi cant ($P < 0.001$). Th e diff erences in perirenal fat thickness between rabbits from group 1 and group 2 were not found to be statistically signifi cant. Perirenal fat thickness in the rabbits from group 3 was higher ($P < 0.001$) than that of the other groups. Perirenal fat weight in group 3 correlated positively ($r = 0.82$; $P < 0.05$) to body weight. Blood biochemical analysis showed that blood glucose, total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) were in the reference range for all groups regardless of the fact that TG and HDL-C in groups 2 and 3 were signifi cantly higher than those in rabbits from group 1. Th e in vivo ultrasound screening of adipose tissue, together with blood lipid profi le, is an indicator of good health and proper energy balance in rabbits bred for meat or as companion animals.

Key words: Rabbits, dissectible fat depots, ultrasonography, fat depots weight, lipid profile

7. Bivolarski, B. & **E. Vachkova**, 2013. Morphological and functional events associated to weaning in rabbits: a review. *Journal of Animal Physiology and Animal Nutrition*, 98 (1), 9–18. **(IF= 1.317 /2013)**

Summary

It is acknowledged that the most critical period of rabbit post natal development comprises the first 10–15 days after weaning, when the animals are most susceptible to gastrointestinal infections and at greatest risk of a fatal outcome. Detailed information on rabbits' weaning is provided. The advantages and disadvantages of early weaning (under 23 days of age) are summarised. Regardless of the numerous reports, the effects of early weaning on the growth and development of bunnies and the physiological status of rabbit does are contradictory. The

morphological changes in rabbit digestive tract related to weaning – development of intestinal mucosa, height of villi, crypt depth and villus height to crypt depth ratio – are described in detail. The review also goes over several functional changes in rabbits' organism during weaning: blood cholesterol, triglycerides, a-amylase, lysozyme, complement, triiodothyronine and thyroxine concentrations, and the time course of epidermal growth factor in the milk of lactating does. Based on published research reports, both ours and of other authors, we suggest that from a physiological point of view, the early weaning of rabbits is not fully justified at present. Nevertheless, the increasing market demand for rabbit meat makes early weaning an attractive alternative for farmers and necessitates further studies on the optimisation of weaning in this species.

Keywords: early weaned rabbits, morphological and functional events, thyroid hormones

8. Ivanova, Zh., B. Bjørndal, N. Grigorova, A. Roussenov, E. Vachkova, K. Berge, L. Burri, R. Berge, S. Stanilova, A. Milanova, G. Penchev, R. Vik, V. Petrov, T. Mircheva Georgieva, B. Bivolraski, I. Penchev Georgiev. 2015. Effect of fish and krill oil supplementation on glucose tolerance in rabbits with experimentally induced obesity. *Eur J Nutr, Volume* 54, Issue 7, pp 1055–1067. **(IF= 3.239 /2015)**

Abstract

Purpose This study was conducted to investigate the effect of fish oil (FO) and krill oil (KO) supplementation on glucose tolerance in obese New Zealand white rabbits. Methods The experiments were carried out with 24 male rabbits randomly divided into four groups: KO—castrated, treated with KO; FO—castrated, treated with FO; C— castrated, non-treated; NC—non-castrated, non-treated. At the end of treatment period (2 months), an intravenous glucose tolerance test (IVGTT) was performed in all rabbits. Results Fasting blood glucose concentrations in FO and KO animals were significantly lower than in group C. The blood glucose concentrations in FO- and KO-treated animals returned to initial values after 30 and 60 min of IVGTT, respectively. In liver, carnitine palmitoyltransferase 2 (Cpt2) and 3-hydroxy-3-methyl-glutaryl-CoA synthase 2 (Hmgcs2) genes were significantly increased in FO-fed rabbits compared with the C group. Acetyl-CoA carboxylase alpha (Acaca) expression was significantly reduced in both KO- and FO-fed rabbits. In skeletal muscle, Hmgcs2 and Cd36 were significantly higher in KO-fed rabbits compared with the C group. Acaca expression was significantly lower in KO- and FO-fed rabbits compared with the C group. Conclusion The

present results indicate that FO and KO supplementation decreases fasting blood glucose and improves glucose tolerance in obese New Zealand white rabbits. This could be ascribed to the ameliorated insulin sensitivity and insulin secretion and modified gene expressions of some key enzymes involved in b-oxidation and lipogenesis in liver and skeletal muscle.

Keywords Fish oil Krill oil Glucose tolerance Obesity Gene expression Lipogenesis

9. **Vachkova, E.**, D. Bosnakovski, P. Yonkova, N. Grigorova, Zh. Ivanova, P. Todorov, G. Penchev, A. Milanova, G. Simeonova, S. Stanilova, I. Penchev Georgiev, 2016. Adipogenic potential of stem cells derived from rabbit subcutaneous and visceral adipose tissue *in vitro*. *In Vitro Cell Dev Biol Anim. 2016;* ***52****: 829–37. DOI 10.1007/s11626-016-0048-7* **(IF= 0.971 /2015)**

Abstract

Rabbits are considered as appropriate animal models to study some obesity-associated abnormalities because of the similarity of their blood lipid profile and metabolism to humans. The current study was focused on comparison of adipose differentiation ability in rabbit adipose-derived stem cells (ADSC) in vitro. Subcutaneous and visceral stromal vascular fractions (SVF) were isolated from three 28-d-old New Zealand rabbits by collagenase digestion. Supernatants from both isolates were collected 24 h after the initial plating. On the fourth passage, all isolated cell types undergo triplicate adipogenic induction. The adipose induction potential was calculated as percentage of increasing optical density (OD) values. The data revealed that with increasing the number of induction cycles, the induction tendency in visceral ADSC decreased in contrast to the subcutaneous ones. Although the supernatants did not reach induction levels of their relevant precursors, they follow the same pattern in both subcutaneous and visceral ADSC. All cell types successfully passed osteogenic and chondrogenic differentiation. In conclusion, the best adipose induction ability was observed in directly plated subcutaneous cell population. The increase of induction numbers depressed adipose induction ability in cell populations derived from visceral fat depots.

Keywords Rabbits . Subcutaneous and visceral ADSC Supernatants . Adipose differentiation potential

В списания с IR (4):

10. Ivanova, Zh., G. Penchev, S. Ribarski, **E. Vachkova**, N. Grigorova, A. Roussenov, P. Yonkova, D. Kostov, T. M. Georgieva, A. Milanova & I. Penchev Georgiev, 2015. Effect of antioxidant treatment on some indicators of obesity-induced changes in insulin sensitivity and beta-cell function in New Zealand white rabbits. Bulg. J. Vet. Med., 18, No 3, 194–208. **(*SJR (2015)=0.184)***

Summary

The current study was conducted to investigate the impact of dietary antioxidant supplementation on obesity-induced changes in some surrogate indices of insulin sensitivity and ß-cell function in New Zealand white rabbits. Three groups of rabbits were used in this experiment: castrated animals treated with antioxidants (vitamin E and d-limonene, Immunoprotect) (Cim; n=6), castrated obese animals (CO; n=6) and non-castrated non-obese controls (NC; n=7). At the end of the follow-up period of 2 months after castration an intravenous glucose tolerance test (IVGTT) was performed after 12-hour fasting. Blood samples for determination of simplified estimates of insulin resistance and β-cell function were obtained at baseline and at various time intervals over the 120-min test. In addition, lipid content in *m. Longissimus lumborum* и *m. Semimembranosus* was determined. Some of the simplified measurements of insulin resistance (fasting insulin, fasting insulin to glucose ratio, HOMAins.resist index), beta-cell function (HOMAβ-cell, AUCinsulin 0→60 min) and muscles lipid content in CO were higher while QUICKI and Bennett indices were lower than in controls. No differences in surrogate indices between CIm and NC groups were found suggesting improvement of insulin sensitivity and β-cell function after antioxidant supplementation. Surrogate indices are simple and reliable indicators of insulin sensitivity and β-cell function in rabbits as they were closely associated with markers of obesity and can be modified by antioxidant supplementation.

Key words: antioxidant supplementation, insulin resistance and β-cell function indices, obesity, rabbits

11. Grigorova, N., Zh. Ivanova, E. Dichlianova, T. Georgieva, T. Slavov, **E. Vachkova** & I. Penchev Georgiev, 2015. The effect of antioxidant treatment on blood lactate and pyruvate concentrations in a rabbit model of obesity. Bulg. J. Vet. Med. (online first**). *SJR (2015)=0.184***

Summary

In the current study, the impact of dietary antioxidant supplementation on fasting blood lactate and pyruvate concentrations in a rabbit model of obesity was investigated. A total of 26 rabbits were randomly divided into 3 groups: castrated and obese animals (CO, n=7); castrated, obese and treated with antioxidants (Immunoprotect, n=7, CIm) and non-castrated, non-treated controls (NC, n=12). At the end of the 2-month treatment period blood lactate concentration, lactate to pyruvate and lactate to glucose ratio in CIm were significantly (P<0.05) lower than in NC and tended to be lower than in CO. No group differences in pyruvate and glucose concentrations were found. There was a significant negative (r =–0.53; P<0.05) correlation between lactate and glucose concentrations. On the other hand, lactate was correlated significantly positively with pyruvate (r=0.72; P<0.01), lactate to pyruvate ratio (r=0.94; P<0.001), lactate to glucose ratio (r=0.75; P<0.001) and pyruvate to glucose ratio (r=0.81; P<0.001). In conclusion, the decrease of blood lactate concentration in antioxidant treated rabbits could be considered as a mechanism for improvement of skeletal muscle insulin sensitivity. In addition, antioxidant treatment could be used as an alternative tool to counteract lactic acidosis in obesity and diabetes.

Key words: antioxidant supplementation, insulin resistance, lactate, obesity, pyruvate, rabbits

12. **Vachkova, E.**, P. Yonkova, N. Grigorova, Z. Ivanova, G. Penchev, B. Bivolarski, S. Stanilova, I. P. Georgiev. 2016. EPA provokes stronger antiadipogenic effect than DHA in differentiated 3T3-L1 cells *in vitro.* Bulg. J. Vet. Med, *(online first)*

Summary

The comparative studies of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) effects on the amount of lipid droplets (LD) and within adipocytes are limited. In this study, 3T3-L1 mouse embryo fibroblasts (ATCC® CL-173™) were expanded up to fifth passage. At the stage of growth arrest, the cells were treated with EPA and DHA separately and in combination at 100 µg/mL for 2 days. Oil Red O staining protocol, subsequent extraction with isopropanol and spectrophotometric determination of absorbed dye were used to establish the amount of intracellular lipid droplets deposition. While DHA administration had no significant effect on reduction of LD intracellular deposition, the EPA treatment decreased optical density (OD) significantly (P<0.05). Furthermore, a synergic effect of combined application of both

PUFAs was not observed. In conclusion, EPA provoked stronger antiadipogenic effect than DHA suggesting that EPA administration would be more effective in already existing obesity.

Key words: 3T3L1, antiadipogenic effects, EPA, DHA

13. Penchev, G., P. Yonkova, S. Ribarski, D. Kostov, **E. Vachkova**, N. Grigorova, T. M. Georgieva, Zh. Ivanova & I. P. Georgiev, 2017. Morphological study on periadventitial adipose tissue of the aortic arch in a rabbit model of obesity: Preliminary results. Bulg. J. Vet. Med. (online first).

Summary
This study was conducted to evaluate the effect of obesity on some morphological features of periadventitial adipose tissue in the aortic arch region. Twelve male white New Zealand rabbits were divided into two groups of 6 animals each: non-castrated non-obese and castrated-obese. Immediately after the rabbits were sacrificed samples from the aortic arch were collected, fixed in 10% neutral formalin for 24 hours, dehydrated and embedded in paraffin. Five μm sections were cut and stained with haematoxylin and eosin. Light microscopy of histological preparations from the aortic arch in the 2 groups showed that the periadventitial adipose tissue was represented of two fat depots. In the castrated and obese rabbits they were of bigger size compared with the lean animals. These greater fat depots were associated with hypertrophy of the adipocytes and increased number of blood vessels. The adipocytes of the fat depots from the two groups were unilocular and had the morphological characteristics of white adipose tissue. It may be concluded that obesity leads to increased mass of periadventitial adipose tissue, adipocytes hypertrophy and angiogenesis in the aortic arch.

Key words: angiogenesis, aortic arch, morphology, obesity, periadventitial adipose tissue, rabbits

В списания без Impact Factor (10):

14. Вачков, А., Д. Канъков, В. Петров и **Е. Вачкова**, 2005. Експериментална *E. coli* инфекция при зайци - хематологични и биохимични промени. Научна конференция с международно участие “Стара Загора’2005”, Том III, 105-110.

ABSTRACT

Experimentally was provoked diarrhea syndrome in forty five days old White New Zealand rabbits. It was used referent strain of *E. coli* U83/39 (O15: H-) (EPEC). The animals were divided in two groups: infected (n=12) and negative control (n=8). There were examined blood samples from all animals for hematological parameters: red blood count (RBC), hemoglobin (HGB), hematocrit (HCT), mean cells volume (MCV), white blood cells count (WBC), differential blood count, and biochemical parameters: urea, creatinine, total blood protein, bilirubin, AST, ALT, ALP, TG. Experimentally infected rabbits showed significant increasing of urea levels ($p<0.05$), leucopenia and decreasing of creatinine levels.

***Key words**: rabbits, E. coli, hematology, biochemistry.*

15. Georgiev, I.P., I. Kanelov, S. Dimitrova, Y. Iliev, S. Tanev, T. Georgieva, B. Bivolarski, **E. Vachkova** & I. Grigorov, 2006. An experimental model for evaluation of glucose tolerance in rabbit. Bulgarian Journal of Veterinary Medicine, 9, No 1, 27-35.

Summary

This study was conducted to develop an experimental model for evaluation of glucose tolerance in rabbits based on the determination of glucose kinetic parameters. Six clinically healthy New Zealand White male rabbits, 3–3.5 months of age, weighing between 2.4 and 3 kg were used. The following kinetic parameters of glucose after intraperitoneal glucose tolerance test (IPGTT) were calculated – half-life for blood glucose disappearance (t½C', min), glucose elimination rate constant (Kel, min1), area under the blood glucose concentration versus time curve (AUC0150 min, mmol.min/L), mean residence time for blood glucose (MRT, min), maximum blood glucose concentration (Cmax, mmol/L) and the time needed to reach Cmax (Tmax, min). Blood glucose concentrations markedly increased after the intraperitoneal injection of glucose at a dose of 2 g/kg, reaching peak values (Cmax = 17.1 ± 3.29 mmol/L) at 47.5 ± 14.75 min (Tmax), then gradually declined and returned to baseline levels at 150 min. The mean values of t½C', Kel, AUC0150 min and MRT were 78.3 ± 10.5 min, 0.0090 ± 0.0012 min1, 1822.6 ± 297.4 mmol.min/L and 127.3 ± 18.4 min, respectively. The results of the present study indicate that the evaluation of kinetic parameters of glucose provides more detailed information on glucose tolerance status than the determination of blood glucose concentration alone and could be used as a basis for further elaboration of criteria to distinguish rabbits with normal and impaired glucose tolerance.

Key words: glucose kinetic parameters, glucose tolerance, rabbits

16.Бинев, Р., А. Русенов, Б. Биволарски, П. Славова, С. Лалева и **Е. Вачкова,** 2007. Електрокардиографски проучвания при различни породи агнета. Федерация „Образование и наука", Том 1, 106-111.

Резюме. *Проведени са електрокардиографски проучвания при 36 клинично здрави агнета, на 6 месечна възраст от породите Тракийска тънкорунна, Мутон-Шароле и Ил дьо Франс. Получените резултати показаха междупородни различия при агнетата с различна продуктивна насоченост, в продължителността на зъбеца P, сегмента S-T, амплитудата на комплекса QRS и вълната T. В останалите параметри на ЕКГ не бяха наблюдавани статистически различия и при трите породи.*

17.Биволарски, Б. Л., И. П. Георгиев, **Е. Г. Вачкова**, К. Д. Сивкова, В. Д. Радев, С. С. Лалева, 2009. Влияние на мултиензимния препарат Protozin-A върху някои биохимични показатели при овце. *Bulgarian Journal of Veterinary Medicine*, 12, Suppl. 1, 104-110.

The aim of present study was to study the influence of the multi enzyme preparation Protozin-A on plasma levels of glucose, lipids, total protein and urea, liver enzymes alanine aminotransferase (ALAT) and gamma glutamy transferase (γ-GT), and thyroid hormones thyroxine (T4) and triiodothyronine (T3) in sheep. The experiments were performed with 6 sheep, whose ration was supplemented with the multienzyme preparation Protozin-A as followed: initially at a dose rate of 1g/kg forage and after that at 2 g/kg forage. Our results showed significant increase in plasma concentrations of lipids, total protein, ALAT, γ-GT and T_4 of formula fed animals. Protozin-A at a dose rate of 1g/kg forage caused a decrease of T_3 and lysozyme levels in treated sheep.

Key words: ALAT, lipids, Protozin-A, sheep, T_3, T_4.

18.Пенчев, И. Г., В. Иванов, Д. Запрянова, Т. Мирчева, И. Канелов, С. Танев, Я. Илиев, Е. Дишлянова, С. Димитрова, Л. Лазаров, **Е. Вачкова**, А. Русинов, 2009. Влияние на кастрацията върху някои показатели на липидния профил на кръвта и инсулиновата резистентност при зайци. *Bulgarian Journal of Veterinary Medicine*, 12, Suppl. 1, 150-155.

This study aimed to investigate the effect of castration on lipid profile and glucose tolerance in rabbits. Sixteen clinically healthy male New Zealand white rabbits were used for this study. The rabbits were divided into 2 groups: experimental (castrated) and control group (non-castrated). Body weight (BW), body mass index (BMI), blood lipid profile and glucose tolerance were determined 2 months after the castration. BW, BMI and plasma concentrations of total lipids, triglycerides and cholesterol in experimental group were constantly higher than in control rabbits. In addition, castrated rabbits showed impaired glucose tolerance and normal blood fasting glucose probably due to the muscle insulin resistance leading to deterioration in glucose homeostasis.

Key words: insulin resistance, lipid profile, obesity, rabbits

19. Bivolarski, B., **E. Vachkova**, S. Ribarski, K. Uzunova, D. Pavlov, Amino acid content and biological value of rabbit meat proteins, depending on weaning age, 2011: *Bulgarian Journal of Veterinary Medicine,* 14, No 2, 94−102.

Summary

The amino acid content and biological value of rabbit meat proteins, expressed as essential amino acid index (EAAI) depending on weaning period were studied. For this purpose, 15 White New Zea-land rabbits were divided into two groups: group A (n=7) – weaned at the age of 21 days, and group B (n=8) – weaned at the age of 35 days. The rabbits were slaughtered at the age of 90 days, in accor-dance with the requirements of humane treatment of animals. It was established that the weaning age of rabbits had an influence on the amino acid content and biological value of meat proteins. In rabbits weaned at the age of 35 days, the biological value of the proteins was higher due to the higher content of basic amino acids (lysine, histidine, arginine), leucines (leucine and isoleucine), and monoamino carboxylic acids (valine). Along with that, the biological value of m. Longissimus Lumborum meat proteins was higher than that of m. Semimembranosus meat. With regard to the amino acid content and biological value of proteins in meat, weaning of rabbits at the age of 35 days is recommended.

Key words: biological value of proteins, essential and non-essential amino acids, rabbit meat

20. **Vachkova, E.** and B. Bivolarski, 2011, Epidermal growth factor content in rabbit doe milk during the different lactation stages. *Agricultural science and technology,* vol.3, No 4, pp 323-326.

Abstract.

The productivity in industrial rabbit farms could be increased by early weaning of the offspring. During the post natal development, the intestinal tract of neonates undergoes morphological

and functional changes. These adaptation events are largely modulated by biologically active substances in milk secretion, such as the epidermal growth factor. Studies in humans, mice, rats, swine, sheep and cattle have shown that the colostrum and milk concentrations of this factor are species-specific. There are however no investigations on the content of epidermal growth factor during the different lactation stages in rabbit does. The present study aimed to establish the content of epidermal growth factor in rabbit doe milk during the different stages of lactation. The experiment was performed with 5 rabbit does for each period of lactation (post parturient hours 24 and 48, and post parturient days 3, 6, 16, 21 and 28). The concentrations of epidermal growth factors in rabbit doe milk ranged between 47.20–152 pg/ml. They were the lowest as compared to those obtained in men and other animal species. Nevertheless, it was established the highest concentrations were attained by the end of the lactation period. The early weaning of rabbits deprives them from epidermal growth factor in a period when its milk concentrations were the highest

Keywords: lactating rabbits, EGF concentratio

21.Bivolarski, B., **E. Vachkova**, S. Laleva, P. Slavova, I. Ivanov, 2011. Comparative studies on some parameters of innate resistance and metabolic profile of sheep and their offspring depending on the ration. *Agricultural science and technology*, vol. 3, No 2, pp 103 - 106.

Abstract

Comparative studies were carried out to evaluate the non-specific resistance and some metabolic profile parameters in Mouton Charollais sheep (n=16) and their offspring (n=10) depending on diet type. It was found out that the compound feed type had various effects on studied parameters. Blood lipids and T increased statistically significantly ($p<0.05$) in sheep. In offspring, considerable changes were observed in blood urea, APCA ($p<0.05$), body weight and 3 daily weight gain ($p<0.01$). There were no significant changes in the other parameters tested (lysozyme, total protein, γ-GT and T).

Keywords: sheep, lipids, urea, T3

22.Bivolarski, B.L., G. G. Beev, S. A. Denev, **E. G. Vachkova**, T. Slavov, 2011, Development of the caecal microbiota in rabbits weaned at different age. *Agricultural science and technology*, vol.3, No 3, pp 212-219.

Abstract.

The experiment was conducted to study the post-natal development of the caecal microbiota in rabbits weaned at different age. A total of 60 healthy New Zealand White rabbits of both sexes, born the same day, were used in the experiment (after controlling for the effect of litter origin and weaning weight and variability). Rabbits were weaned both at 21 days (W21 group, 30 litters) and at 35 days (W35 group, 30 litters) of age. The weaned animals were randomly housed in wire net cages measuring in well-controlled experimental facility. They received standard commercial pelleted diet without antibiotics. Feed and drinking water were available ad libitum. Results of the microbiological examination of the caecal contents indicated that rabbits weaned at 35 day had higher total bacterial count (TBC) per g of caecal content, in comparison with rabbits weaned at 21 day ($P<0.001$). The TBC in the caecum of earlier and later weaned rabbits after weaning increased significantly ($P<0.001$). The obligate anaerobic bacteria, particularly Bacteroides spp. constitute an important group of microorganisms in the rabbit caecum. The population of Bacteroides spp. increased with advancing of age. The differences between groups on days 35, 42 and 49 were statistically significant ($P<0.001$). Sporulating bacteria and especially Cl. perfringens was present in low variable amounts in all the caecal samples obtained from healthy animals. Caecal counts of Cl. perfringens at weaning (21 and 35 day) were very low (1.656 and 1.654 log10 CFU/g, respectively) and not affected by weaning age. To the end of the study, earlier weaned rabbits had higher caecal count of Cl. perfringens ($P<0.01$). Enterococcus spp. and coliforms, including E.coli are an important part of the caecal microbial population of rabbits. The caecal number of coliforms was considerably high at weaning, then decreased linearly and stabilized on low level at day 49. Our study demonstrated the absence of Lactobacillus spp. in the rabbit caecal tract. The pH of the caecal content fell linearly throughout the experiment - there are not significant differences between groups at days 21 and 49. Compared to the W21 group, rabbits in the W35 group, had a higher live body weight ($P<0.001$) and low mortality during the trial.

Keywords: rabbits, caecal microbiota, weaning age

23. Lazarov L., I. Valchev, R. Simeonov, **E. Vachkova**, Ts. Hristov, D. Teneva, M. Valkova. 2012. A clinical case of ochratoxin A and zearalenone intoxication in pigs. *Journal of Mountain Agriculture on the Balkans*, vol. 15, 6, (1299-1312)

SUMMARY

A spontaneous case of mixed intoxication with ochratoxin A and zearalenone in pigs is presented. The intoxication was observed at a farm with 6000 pigs near Stara Zagora, with 400 pigs weighing over 20 kg exhibiting clinical signs. The intoxication had occurred as a result of feeding with corn and soybean meal, kept in an environment with high humidity. The concentration of ochratoxin A in the corn was 21.47 µg/kg, and 18.81 µg/kg in the compound feed. The predominant clinical signs were catarrhal and haemorrhagic enteritis, convulsion, and impaired coordination. An increase in the blood level of liver transaminases (ASAT and ALAT) was observed in the sick as well as the clinically healthy pigs. The observed mortality rate was about 10% of the affected pigs. There were also considerable losses due to casualty slaughtering and increased feed consumption per unit of weight gain.

Key words: ochratoxin A, zearalenone, pigs

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