

ABSTRACTS OF THE 24TH HUNGARY CONFERENCE ON RABBIT PRODUCTION**KAPOSVÁR, HUNGARY. 30TH MAY, 2012.**

Some 100 guests took part in the 24th Hungarian Conference on Rabbit Production in Kaposvár, organised by the University of Kaposvár, the Hungarian Branch of the WRSA and the Rabbit Production Board. This is the largest and most popular event for rabbit breeders in Hungary. Seventeen papers were presented, both by senior and young scientists. Topics of the papers covered all fields of rabbit production (production, housing and welfare, reproduction, genetics, nutrition, meat quality and pathology). Full papers are available from the organiser (matics.zsolt@ke.hu) on request.

SITUATION OF RABBIT PRODUCTION IN HUNGARY IN 2011

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Compared to 2010, live rabbit purchasing and carcass exports increased by 13%, mainly due to the stabilisation of market conditions. The Euro/HUF exchange rate was favourable for rabbit meat exports. Throughout the year, the costs of feed ingredients, medication and labour did not change. The price of live rabbits was balanced (420-450 HUF/kg live weight). Small-scale rabbit production has almost ceased and supplies only 1-2% of the total purchased quantity. Contributions of the Hycolc, Pannon white, Debreceni white, Hyla and Zika breeds were 54.7, 36.0, 4.6, 2.2 and 1.5%, respectively. Hungary has 60-65 large rabbit farms, with 85000 rabbit does in production. The 2 slaughterhouses process 70-75000 growing rabbits per week. Despite the campaign by the Hungarian Rabbit Breeders' Board to stimulate local rabbit meat consumption, only 3-4% of total rabbit meat production is sold in Hungary. The aim of the Hungarian Rabbit Breeders' Board is to increase the current growing rabbit production (4.7 million) to 7 million/yr until 2020. For this reason, a "sector strategy" was defined and presented to the Ministry.

EFFECTS OF SHORT TERM RESTRICTION STRATEGY ON THE DIGESTIVE HEALTH AND PHYSIOLOGY AND GROWTH AND FEED CONVERSION OF THE RABBIT

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The different effects produced by a post-weaning intake limitation strategy on the growing rabbit are reviewed. Although quantitative feed restriction leads to slower growth, in proportion to the intensity and length of the restriction period, these strategies are now used by 90% of French rabbit breeders, as they offer the advantage of reducing the post-weaning mortality and morbidity rate due to digestive disorders (such as Epizootic Rabbit Enteropathy). In return, feed conversion (FC) is improved during the restriction, and more particularly when the rabbits are again fed freely, as a compensatory growth occurs. This better FC arises from a better digestion associated with a slower passage through the intestine, whereas the digestive physiology is slightly modified (morphometry of the intestinal mucosa, fermentation pattern and microbiota). Meat quality and carcass characteristics are not greatly affected by short term feed restriction, except for a lower dressing-out percentage. The consequences of intake limitation for animal welfare are debatable, as feed restriction leads to hunger, but it reduces the incidence of digestive troubles after weaning. However, the growing rabbit adapts very well to an intake limitation strategy,

without any peer aggressive behaviour. In conclusion, restriction strategies could improve the profitability of rabbit breeding, but they should be adapted to any specific breeding situation, according to the national market, feed prices, etc.

EFFECT OF LINSEED OIL, VITAMIN E AND SELENIUM SUPPLEMENTATION IN DIET ON MEAT QUALITY OF GROWING RABBITS

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The aim of the study was to examine the health protective effect of meat from rabbits fed on a diet with linseed oil, vitamin E and selenium supplementation. In particular, the n3 FA proportion, n6/n3 FA ratio, vitamin E and selenium content were taken into account. Instead of 3% sunflower oil, the supplemented diet contained 3% linseed oil, as well as 260 mg/kg more vitamin E instead of 60 mg/kg, and its selenium content was increased from 0.1 to 0.46 mg/kg. Rabbits were weaned at the age of 5 wk, and the supplementation (S) was fed for 1 (S1), 2 (S2), 3 (S3) or 4 wk (S4) in the pre-slaughter period. The control group (C) was fed a non-supplemented diet throughout the study. Rabbits were slaughtered at 11 wk of age and *longissimus dorsi* (MLD) and thigh (HL) were sampled. The Σ n6 fatty acid content (mg fatty acid/g meat) of HL was slightly different between groups C and S3, while in the S4 it decreased significantly; this decrease was continuous and significant in the MLD for all groups. The n3 FA content increased, as compared to the C group to 2.5, 4.8, 4.8 and 3.6-fold values in the HL, and to 2.0, 2.8, 3.1 and 3.7-fold levels in the MLD in the groups S1, S2, S3 and S4, resp. The largest increment was found between groups C and S4 for C20:5 n3 (5.9 and 5.7-fold increases), which was followed by C18:3 n-3 (4.0 and 4.7-fold), by C22:5 n-3 (2.8 and 3.1-fold), and by C22:6 n-3 (2.0 and 2.5-fold) in the HL and MLD, resp. The n6/n3 ratio decreased after 2 wk of S feeding from 14.8 and 13.6 to 4.5 and 4.2, and in the S4 group to 2.3 and 2.4. The vitamin E content increased only in the MLD significantly, among groups C and S3 and S4, while in the HL the S3 group its concentration was lower, as in the C and S1 groups. In the meat of the S diet fed rabbits, the selenium concentration increased in parallel with the feeding time interval. As compared to the C group in groups S1, S2, S3 and S4, in the HL the increment was 1.4, 1.6, 1.8 and 2.0-fold, while in the MLD 1.4, 1.4, 1.6 and 2.0-fold. Results have proven

that linseed oil, vitamin E and selenium supplementation improves the value of rabbit meat to a functional food. To achieve the desired effect, a 2-3 wk feeding period is recommended.

EFFECT OF DIETS WITH DIFFERENT COMPOSITION AND NUTRITIVE VALUE ON RABBIT DOES' PRODUCTION

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The effect on rabbit doe performance of a standard diet (S) with 16.7% crude protein (CP), 2.55% ether extract (EE), 17.9% crude fibre (CF) and 10.8 MJ/kg digestible energy (DE) content and of 6 isonutritive diets with higher nutritive value (16.5-18.2% CP, 3.69-4.22% EE, 15.0-15.6% CF and 11.3-11.4 MJ/kg DE), but created from different raw materials, was studied. Compared with the intensive diet (I), the soybean and wheat bran content was reduced and substituted by 5% malt in the M diet. Carob diet was supplemented with 5% carob pulp (C) and contained less alfalfa, beet pulp and wheat bran and more soybean than the I diet. Oats were added at 10.5% at the expense of alfalfa, beet and wheat bran in the O diet. The low-protein diet (LP) had low CP (16.5%) but high fat content (4.13%) and was supplemented with 0.8% lysine, 0.3% threonine and 0.2% methionine. The fine-protein diet (FP) with 17.3% CP content did not contain soybean, but the ratio of beet pulp was increased and four high-digestible feed additives, i.e. 2.5% Brewer's yeast, 2.5% refined potato protein (Protastar), 2.5% soya concentrate (HS-500) and 4.5% energy product (Energocid-40) were added to this diet. Does and kits were fed these diets from kindling till weaning (day 35). The free-nursing NZW, Pannon White and Californian does (except the 3-day biostimulation) were re-inseminated on day 11 postpartum. The production of 3 consecutive breedings was studied (Artificial Insemination=520). Kindling rate was higher in the I does than in the C rabbits (81 vs. 66%, $P=0.042$) and was 68-79% in the other does. Litter size and weight were not affected by the diets. The 35-d weaning weight was high in the I, O and FP kits (863-888 g), low in the S and LP rabbits (823-838 g) and average in the other kits (856-860 g) ($P=0.001$). Compared to the S does, productivity of the I, O (both +22%), M (8%) and FP does (+7%) increased.

The I and LP does were heavier at weaning ($P=0.001$) than the M, C, O and FP does. Between lactation days 21-35, the I does lost less weight than the S, C, LP and FP does ($P=0.009$). Calculated 1-35 d feed intake (doe+litter) was 8, 9 and 6% lower in the I, FP and LP rabbits than in the S rabbits. Both the composition and nutritive value of the diets affected doe production. Productivity improved with I, O, M and FP diets.

APPLICATION OF BLUP METHOD IN RABBIT BREEDING

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18609 litter weight records of 4413 rabbit does were analysed using a BLUP repeatability model. The model contained parity, year-month of kindling, number of reared kits and age at measurement as environmental factors (fixed effects). Along with the additive genetic effects, the model contained permanent environmental effects as random effects. Based on the results, it could be concluded that the highest litter weights at 3 wk were observed at the 3rd and 4th parities. Year-month of kindling and number of reared kits substantially affected the litter weight at 3 wk. On the contrary, due to the small magnitude and variability of age at measurement, this effect was considered as nuisance in terms of litter weight.

CORRELATION BETWEEN *IN VIVO* THIGH MUSCLE VOLUME ESTIMATED BY CT AND SLAUGHTERED THIGH MUSCLE WEIGHT IN DOMESTICATED RABBITS

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Thigh muscles of 554 rabbits were volume determined by computer tomography (CT) - scanned at a mean age and body weight of 10 wk and 2668 kg, respectively - included in this study. The aim of this study was to determine correlation between the *in vivo* estimated thigh muscle volumes (cm³) determined by CT and slaughtered thigh muscle weight (g) in Pannon White rabbits. Depending on the Hounsfield units (HU) that defined muscle, the correlation coefficients obtained were 0.79, 0.88, and 0.89, respectively. The highest correlation coefficient (0.89) was found using the HU 20-120 interval. These values were higher than the corresponding values when

applying partial correlation using PROC CORR of SAS, removing the effect of body weight. Additionally, the study aimed to estimate Pearson correlation using sub datasets restricting the slaughter weights to different intervals (2.2-2.8 kg; 2.4-2.6 kg). When narrowing the interval, lower correlations were found.

EFFECT OF LIGHTING SCHEDULES (16L:8D OR 12L:6D) ON REPRODUCTIVE PERFORMANCE OF RABBIT DOES

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The aim of the experiment was to compare the reproductive performance of rabbit does in a routine (16L:8D) and in a proportionally shorter (18 h) 12L:6D lighting regime. The experiment was conducted at the Kaposvár University experimental rabbit farm. Crossbred rabbit does were randomly housed in 2 identical rooms. Drinking water and commercial pellet were available *ad libitum*. Temperature varied between 14-28°C, depending on the season. The 2 rooms only differed in the lighting schedule: 24h group=16 h light and 8 h dark (n=54 does); 18h group=12 h light and 6 h dark (n=54 does). Rabbit does were first inseminated at 16.5 wk of age. Artificial insemination was applied 11 d *post partum* (42 d reproductive rhythm, single batch system). Cross-fostering was applied within groups with maximum 8 kits/litter at first kindling and maximum 10 kits/litter at subsequent parities. Rabbit does could nurse their kits freely. Data on the first 5 consecutive reproductive cycles were evaluated. Body weight of the does at kindling, kindling rate, litter size at birth, at day 21 and 35 showed no significant differences between the groups. Kit mortality rates for the periods of 0-21 and 0-35 d were independent of the lighting schedule. Litter weight at day 21 and 35 was 4% lower in the 18h group compared to the 24h group ($P<0.05$). Calculating the productivity index, the number of kits born alive and number of kits at day 35 per 100 AI were 7.5% (813 vs. 757 kits) and 5.2% (714 vs. 679 kits) higher in the 18h group compared to the 24h group, respectively. Considering the opposite tendencies of the kits' body weight, the 2 groups did not differ for the total weight of the weaned rabbits per 100 AI (18h: 630 kg; 24h: 632 kg). Survival of the does did not differ significantly during the experimental period (83 and 81% in groups 18h and 24h, respectively, $P=0.735$). Reproductive performance of rabbit does housed in a routine (16L:8D=24 h) or proportionally shorter (12L:6D=18 d) lighting schedule was similar.

EFFECT OF LIGHTING SCHEDULES (16L:8D OR 12L:6D) ON NURSING BEHAVIOUR OF RABBIT DOES

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The aim of the experiment was to compare the nursing behaviour of rabbit does in a routine (16L:8D) and in a proportionally shorter (18h, 12L:6D) lighting schedule. The experiment was conducted at the Experimental rabbit farm of the Kaposvár University. Thirteen week old crossbred female rabbits were randomly housed in 2 identical rooms in flat deck cages. The 2 rooms only differed in the lighting schedule: 24h group: 16 h light and 8 h dark (n=9 does), 18h group: 12 h light and 6 h dark (n=8 does). The rabbit does were first inseminated at 16.5 wk of age. Artificial insemination was applied 11 d *post partum* (42 d reproductive rhythm, single batch system). Number of kits/litter was equalised to 10, and rabbit does could nurse their kits freely. The nursing behaviour of the does was examined (duration, number of events per day, distribution of nursing events) over a 144 h period from the beginning of the lighting period on day 4th to the beginning of the lighting period on the 10th d of the second lactation. Infrared cameras were used for observation. 138 nursing events were evaluated during the 2448 h time period. The daily number of nursing events was not different in the 2 groups (1.29±0.35 and 1.41±0.29, respectively; $P=0.470$). The percentage of 24 h periods with ≥2 nursing was 41.5 and 27.1% in groups 24h and 18h, respectively. In routine lighting schedule (24h group, 16L:8D), 77.6% of the nursing events took place during the dark period and in the 2 h after light switch-on and does nursed their kits most frequently during the first 2 h of the light period (28.9%). This tendency could not be observed in the 18h group. Only a small number of the nursing events were recorded during the dark period (19.4%) and in the 2 h after light switch-on (16.1%). Seeing the nursing events of 18h group in 24 h intervals and lighting schedule in which the 18h rabbit does were born and grew up, the distribution of nursing events is partly based on 16L:8D lighting schedule. Contrary to our hypothesis, applying a “reduced day” (12L:6D=18h) instead of the routine 16L:8D lighting schedule did not increase the number of nursing events per 24 h. Based on the distribution of nursing events in the 24 h period, it seems that 18h rabbit does nursed their kits according to the lighting schedule (16L:8D) which was applied during their growing period.

EFFECT OF DIFFERENT HOUSING CONDITION ON PRODUCTION AND CARCASS TRAITS OF GROWING RABBIT

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The effect of cage and pen size (depending on the group size) on the production and slaughter performance of growing rabbits was analysed. In the first group, 5 wk old full-sib rabbits were placed in cages (8 rabbits per cage); in the other group, the rabbits were placed in pens (65 rabbits per pen). The cage and pen floors were made of wire mesh and plastic mesh, respectively, while both cages and pens were equipped with plastic mesh platforms. Stocking density was 16 rabbits/m² for both groups. The rabbits housed in cages had significantly higher body weight at the ages of 9 and 11 wk (2181 vs. 2088 g and 2540 vs. 2443 g, respectively), higher average daily gain between the ages of 7 and 9 wk (38.0 vs. 33.3 g/d), and better feed conversion ratio between the ages of 7 and 9 and 5 and 11 wk (3.61 vs. 4.28 and 3.39 vs. 3.61). In contrast, they had lower mortality rates (0 vs. 5.4% and 5.2 vs. 27.0% and 5.2 vs. 31.5%, respectively) compared to rabbits housed in pens. Among the pen housed rabbits, injuries originated by aggression were detected at the age of 9 wk, contrary to cage housed rabbits, where injuries were detected only at the end of the experiment. Body weight at slaughter (2540 vs. 2469 g), weight of the hot (1514 vs. 1450 g), chilled (1477 vs. 1415 g), and reference carcass (1238 vs. 1173), weight of the fore - (353 vs. 338 g), mid (405 vs. 379 g) and hind parts (453 vs. 436 g) and weight of the perirenal (20.8 vs. 15.1 g) and scapular fat (6.23 vs. 5.13 g) were higher in the cage housed rabbits. The ratios of the mid part and the perirenal fat to the reference carcass (32.6 vs. 32.2%, and 1.65 vs. 1.25%, respectively) were higher for the rabbits placed in cages, while the ratio of the hind part compared to the reference carcass (36.7 vs. 37.3%) was significantly larger for the rabbits housed in pens. No differences were observed between the groups for weight of the heart, lungs, liver and kidneys or for meat quality traits (pH and meat colour). Based on the results, it may be concluded that housing the rabbits in larger groups is unfavourable in terms of production and animal welfare. Moreover, as the locomotor behaviour is increased the ratio of the hind part compared to the reference carcass is increased and the amount of the fat depots decreased, while no alteration was detected for meat colour and pH.

EXAMINATION OF FREE CHOICE OF GROWING RABBITS AMONG DIFFERENT FLOOR TYPES

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Location preference of growing rabbits was evaluated depending on the different floor types (plastic-mesh, wire-mesh and deep-litter). The experiment was conducted at the Kaposvár University experimental rabbit farm, using growing rabbits from maternal line of the Pannon Rabbit Breeding Programme (n=129). The average temperature in the room was 10.5°C. At weaning (5 wk) the rabbits were placed in one of the 3 pens, each with a basic area of 3.8m² (1.9x2.0m) (43 rabbits/pen, 12 rabbits/m²). The floor of the pens was partly wire-mesh (1/3), plastic-mesh (1/3) and deep-litter (straw, 1/3). With infrared cameras, 24h video recording took place once a week, between 5 and 11 wk of age. The number of rabbits at each location in the pens was recorded every 30 minutes. The 24h observations were divided into four 6h periods. Frequencies at the different locations were compared by means of Chi-square test, testing the difference between observed and expected (33.3%) frequencies. The rabbits showed the highest preference for plastic-mesh ($P<0.001$); at every age they spent more time there (70 and 52%, at the ages of 5.5 and 10.5 wk, respectively) than the expected value (33.3%) in cases of random choice of floor type. Between the ages of 5.5 and 9.5 wk, the preference for the wire-mesh floor was significantly lower than 33.3% (20-27%; $P<0.001$), but at the age of 10.5 wk it was not significantly different from a value of 33.3% ($P>0.1$). Deep-litter was the least frequently chosen floor type at all ages (8 and 14%, at the ages of 5.5 and 10.5 wk, respectively; $P<0.001$). Similar tendencies were observed when the location preference was evaluated separately for the different day parts. Based on the results, it may be concluded that at 10°C temperature the growing rabbits showed the highest preference for the plastic-mesh and the lowest preference for deep-litter; the preference for wire-mesh floor was a little lower than the expected value (33.3%).

ECONOMIC EVALUATION OF CARCASS TRAITS OF RABBIT GENOTYPES

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The aim of the study was to carry out an economic evaluation of different genotypes based on the cost factors of feed and the revenue from processed products. Pannon White (PW) and maternal line (M) does were inseminated with the sperm of 3 genotypes: M, PW, or a large body line (LB), each selected on different criteria (M: litter size, PW: weight gain and carcass traits, LB: weight gain and carcass traits). Progenies of 7 genotypes of different crossing combinations (n=224) were evaluated: MM, MPW, MLB, PWPW, PWM, PWLB, and LBLB. Rabbits were weaned at the age of 5 wk. Body weight was measured at 5 and 11 wk and the feed intake fortnightly. The weight of whole carcass, head, heart and lung, liver, kidneys, fore part, loin fillet, mid part's bone, thigh meat and thigh bone were quantified. The revenue from whole carcass and carcass parts was based on the Italian market price. Gross margin was calculated at production chain level (including farm and slaughterhouse) based on the actual weight at slaughter and of 2.5 kg. Cost to revenue and gross margin to cost ratio, as well as the efficiency, were determined on equal weight in all genotypes. MM provided the lowest values in terms of cost of weaned and slaughtered rabbits and production cost, followed by PWPW, while LBLB was the most expensive. Based on the actual slaughter weight, LBLB realised the highest total revenue from carcass parts (9.31 €) and the highest gross margin (5.58 €/rabbit), followed by PWLB (8.94 € and 5.54 €/rabbit, respectively). While calculating on equal slaughter weight of 2.5 kg, the highest gross margin was found in PWPW (5.06 €), followed by PWLB (4.90 €). The best cost to revenue ratios (38.1 and 38.6%) and gross margin to cost (163 and 159%) were found in the case of PWPW and PWLB, respectively. Despite the general negative correlation between adult weight and carcass traits, on average the performance of progenies of PW does and the progenies of LB males were superior. Comparing the pure genotypes, calculated on equal slaughter weight, Pannon White rabbits reached the best results in terms of cost to revenue, gross margin to cost ratios and efficiency, followed by the maternal line and the large body line. In general, long-term CT-based selection on carcass traits leads to the development of more valuable genotypes in terms of cost to revenue and gross margin to cost ratios and efficiency.

BACTERIOCIN-PRODUCING MICROBIOTA ISOLATED FROM PANNON WHITE AND THEIR APPLICATION IN RABBIT HUSBANDRY

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Enterococci-lactic acid bacteria are able to produce antimicrobial substances, enterocins, possessing probiotic properties. Faecal samples of 122 Pannon white rabbits were checked for bacteriocin production. Species *E. faecalis*, *E. faecium*, *E. durans*, *E. avium* were detected by genotyping. *E. faecium* EF9a active against target of indicator bacteria (activity 200-12800 AU/mL) was selected for *in vivo* experiment. The rabbits (Hycole, both sexes, age 5 wk) were divided into 2 groups (EG, CG), 24 animals in each. Rabbits in EG were administered 500 µL of EF9a per animal (109 Colony-forming unit/mL) in drinking water for 28 d. Samples were taken at day 0, 28 (4 wk after application) and 42. EF9a reached 3.99 ± 0.89 (log₁₀) CFU/g concentration in faeces. Its counts in caecum and appendix they were lower than 1.0 CFU/g. At day 28, significant decrease of staphylococci ($P < 0.01$), coliforms, pseudomonads ($P < 0.001$) was detected in EG faeces. The number of clostridia decreased slightly. The counts of staphylococci, coliforms, pseudomonads were also significantly decreased in caecum at day 28 ($P < 0.01$, $P < 0.001$, $P < 0.05$, respectively); in appendix they were slightly decreased, at day 42 as well. Phagocytic activity in EG was significantly increased ($P < 0.001$) at day 42. Lactic acid, organic acids concentrations in chymus, other biochemical parameters and functionality of intestinal mucosa were not influenced. Administration of EF9a increased average daily weight by 11.6% compared to CG.

ANALYSIS OF RABBIT SEMEN CRYOPRESERVATION PROTOCOLS

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Due to several advantages, artificial insemination (AI) becomes an important method in the practice of rabbit breeding. Breeders normally use fresh semen for insemination, but in some special cases cryopreserved semen is applied. It is possible to create a gamete bank using cryopreserved semen samples. Frequently, the ratio of survived cells barely reaches the required minimum value (35-40%) for successful AI. In this study, we compared the efficiencies of two rabbit semen cryopreservation protocols. According

to the results, no significant differences between the protocols were found. The most critical technical step of a cryopreservation protocol is the incubation of straws in liquid nitrogen vapour. The ratio of live and fertile sperm cells is significantly reduced during this step. To further optimise the step, the effect of incubation time (5, 10, 20 min) and the distance of straws from the surface of LN₂ (4, 8, 12 cm) was studied. According to our experiments, the incubation of straws at 4 cm for 5 min results in the same ratio of survived and fertile sperm cells as the original incubation step, so in this case we could shorten the original cryopreservation protocol to 25 min.

REPRODUCTIVE TOXICITY OF T-2 TOXIN IN MALE RABBITS

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Several studies have concluded that the main factors in male subfertility or infertility can be attributable to environmental factors, such as mycotoxins, as frequently occurring dietary toxins. In a pilot study, we examined the subsequent effect of T-2 toxin applied in high dosage (4 mg/animal) for 3 d on the male reproductive processes in rabbits. One day of T-2 toxin treatment dramatically decreased voluntary feed intake, which remained lower during the first 2 wk after withdrawal of the toxin. Body weight of the contaminated rabbits dropped to 88% on days 17 and 29 compared to controls. The subsequent effect of T-2 toxin applied to rabbits in high doses manifested as decreased sperm motility, an increase in the number of spermatozoa with morphological abnormalities, and a drop in the testosterone level even after 48 d following a 3-d long acute toxicosis. In another study, male rabbits were exposed to 0 (control), 0.05, 0.1 or 0.2 mg/animal day T-2 toxin by gavage for 63 d. T-2 toxin in 0.1 and 0.2 mg daily doses significantly decreased feed intake, which became compensated after the 2nd and 3rd week, respectively. None of the sperm quality parameters examined showed significant difference between groups, except the ratio of spermatozoa with cytoplasmic droplets, which increased in animals treated with the highest dose of T-2. The 2 lower doses applied via feed (i.e. mixed into the feed to get 0.33 and 0.66 ppm T-2 containing diets) had no significant effect on feed intake, body weight, or any spermatological parameters. According to the results of the 2 chronic

experiments, the 2 lower doses may be tolerated by adult male rabbits without any detrimental changes in reproductive parameters.

EFFECT OF DIETARY SUPPLEMENTATION OF SPIRULINA (*ARTHROSPIRA PLATENSIS*) AND THYME (*THYMUS VULGARIS* L.) ON PRODUCTIVE PERFORMANCE AND CARCASS TRAITS OF GROWING RABBITS

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The aim of this study was to evaluate the effect of supplementation and length of the supplementation (between the ages of 5-11 or 8-11 wk) of diet for growing rabbits by spirulina or/and thyme on the production of growing rabbits. The experiment was conducted at the experimental rabbit farm of the Kaposv^{ar} University using maternal line rabbits (n=294). At weaning the rabbits were randomly sorted into 7 groups (42 rabbits/group). Rabbits of the control group (C) received a pellet throughout the experiment (5-11 wk of age) without any supplementation. In the other groups, the pellet was completed by 5% spirulina (S), or 3% thyme (T) or by both (ST) for the whole (5-11 wk; groups: S-S, T-T, ST-ST), or for the end of the growing period (8-11 wk; groups: C-S, C-T, C-ST). Supplementing the diet with spirulina or/and thyme had no effect on the rabbits' weight gain, body weight, feed consumption, morbidity and mortality. Significant differences were only found for feed conversion ratio (8-11, 5-11 wk) of the C-T and C-C groups to the advantage of the C-T rabbits ($P < 0.05$). The carcass traits of different groups did not differ significantly. Based on the results, the feed supplements applied separately or jointly had no substantial effect on the growing rabbits' production and health status.

EFFECT OF DIETARY SUPPLEMENTATION OF SPIRULINA AND THYME ON CAECAI FERMENTATION IN RABBITS

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The purpose of this study was to evaluate the effect of supplementation (between the ages of 5-11 wk) of growing rabbits' diet by spirulina or/and thyme on microbiota and fermentation activity of caecal bacteria. The experiment was performed at the Kaposv^{ar} University rabbit farm. Rabbits were weaned at 35 d of age and split into 4 groups according to diet. The control diet was formulated with no supplementation, while the others were supplemented with 5% spirulina or 3% thyme, or both. Six healthy animals from each group were randomly selected and sacrificed at 35, 56 and 77 d of age. The digestive tract was removed and the caecum was separated. The pH value of caecal content was measured. No diet effect on pH of caecal content was detected. Number of *E. coli*, total anaerobic and strictly anaerobic bacteria decreased by age, and no effect of the diet could be detected. Supplementation with thyme resulted in a slightly higher ratio of propionic acid, but the difference was not significant. In conclusion, spirulina and/or thyme supplementation of diet after weaning had no substantial effect on the composition of caecal microbiota and VFA production.

EFFECT OF DIETARY SUPPLEMENTATION OF SPIRULINA (*ARTHROSPIRA PLATENSIS*) ON BACTERIAL DIVERSITY IN THE CAECUM OF RABBITS

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The composition and activity of caecal microbiota have a strong influence on health in growing rabbits, but only about 24 to 40% of the microbial species of the microbiota can be cultured *in vitro*. The experiment was carried out with rabbits (Pannon White) from the Kaposv^{ar} University rabbit farm. Young rabbits were weaned at 35th day of life. Spirulina - a type of blue-green algae, rich in protein, vitamins, minerals, and carotenoids, containing nutrients - has been used as a human food supplement for over 20 yr, but its use as an animal feed supplement has only appeared in the last few years. Recent studies have shown that spirulina has several biological activities,

such as immunomodulation and antioxidant, anticancer, antimicrobial and probiotic effects. The aim of this study was to evaluate the effect of supplementation of the growing rabbits' diet by spirulina (treated group) on the bacterial diversity of the rabbits' caecum with the aid of bacterial ribosome coding DNA based quantitative PCR (QPCR) reactions at the Molecular Biology Laboratory, University of Kaposvár. After preparation of caecal samples (bacterial DNA extraction), the quantities of bacteria (belonging to phyla Firmicutes and Bacteroidetes) were determined by QPCR reactions. MxPro 3000P QPCR apparatus (Agilent Technologies) was used for the bacterial target sequence amplification, applying primers and SYBR Green in the experimental assembly. Specificity of PCR reactions was checked by melting point analysis. All bacterial groups investigated showed slight changes, which occurred both in the control and treated groups. The amount of Bacteroidetes and Clostridium group bacteria representing the Firmicutes phylum displayed a slight increase. Given the absence of significant changes in the caecum portion, we may conclude that spirulina has no significant effect on the monitored bacterial community.