

**ABSTRACTS OF THE “GIORNATE DI CONIGLICOLTURA ASIC 2009”****FORLÌ, ITALY, APRIL 2-3, 2009**

The third edition of the Giornate di Coniglicoltura ASIC 2009 (Italian Rabbit Days), product of the collaboration between ASIC (Italian Rabbit Scientific Association), Avitalia (Italian Poultry and Rabbit Producers Association), ASPA (Animal Production Scientific Association) and Forlì Fair was held in Forlì at 2-3 April 2009. The first day of the congress was focused on a Round Table entitled “Biosecurity and welfare in rabbit farming”. During the second day it were presented three main lectures: “Possibilities to reduce the feed conversion in rabbit production” by L. Maertens, “Role of type of fibre on intestinal microbiota and performance in rabbits” by J. García, M. Gómez-Conde, A. Pérez de Rozas, I. Badiola, M.J. Villamide, C. de Blas, R. Carabaño, “The relationship between housing systems and animal welfare” by Zs. Szendrő. Moreover, sessions of oral communications on Reproduction and Genetics, Nutrition and Physiology, Management and Meat Quality, and Pathology were held. A Poster Session was through the two days. The congress was attended by about 80 participants, including researchers from Spain, Belgium, Greece and The Netherlands. A total of 3 main lectures, 11 oral communications and 9 posters were presented. Following are reported the abstracts of all contributions.

**MAIN PAPERS****POSSIBILITIES TO REDUCE THE FEED CONVERSION IN RABBIT PRODUCTION**

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Different possibilities to reduce the feed conversion ratio (FCR) both in fatteners and females are discussed. The dietary factor having the largest impact on the FCR in fatteners is the energy concentration. Within practical margins, an increase with 0.5 MJ DE/kg leads to a decrease of the FCR with 0.15-0.20 points. The fibrous rabbit diets can be made more energy dense by using fat or oil rich feedstuffs. In a phase feeding schedule, a significant decrease of the FCR can herewith be obtained in the finishing period. Once fatteners have a weight of 2.0 kg, their FCR exceeds 3.25. The use of a quickly growing sire line (high correlation with FCR) leads to a reduction of the FCR of over 10% during the fattening stage. In females, the number of weaned young is the most determining factor. An increase with 5 young per year decreases the FCR in the maternity with 11%. When simultaneously the post-weaning mortality decrease with 5%, the positive impact on the FCR is even 18%. Losses in the fattening stage, especially in the finishing period have a large impact; e.g. a decrease from 10 till 5% reduces the FCR in the fattening unit with 6.6%. Also a correct restriction of fatteners or non

lactating does is helpful to reduce the farm FCR. High stocking density or large group sizes leads to a less favourable FCR. Optimization of the different factors involved in the FCR leads to a farm FCR around 3.0.

**ROLE OF TYPE OF FIBRE ON INTESTINAL MICROBIOTA AND PERFORMANCE IN RABBITS**GARCÍA J.\* , GÓMEZ-CONDE M.\* , PÉREZ DE ROZAS A.† ,  
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In this work the new approaches and methods to the dietary fibre concept and its relation with the intestinal microbiota are reviewed. Fibre is the largest dietary fraction in rabbit diets. It influences rate of passage and constitutes an significant substrate for intestinal microbiota that might affect rabbit health and performance. However, the definition of fibre, its separation in different fractions and the way to quantify and characterize it is still under discussion. Besides, new molecular techniques have been developed to improve the study of intestinal microbiota that might help to understand better its relationship with the level and type of fibre. Recent data seems to indicate the important role of dietary soluble fibre level, as well as its balance with insoluble fibre, in minimizing the effects of epizootic rabbit enteropathy.

## THE RELATIONSHIP BETWEEN HOUSING SYSTEMS AND ANIMAL WELFARE

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Under natural conditions European wild rabbits can balance between the benefits and costs to mark the best decision. Farmed rabbits are under the control, their welfare depends mainly on the housing conditions created by people. When the group size is above 4-5 rabbits, maximum a litter together, the disadvantages (higher risk of contamination with diseases and mortality, higher rate of aggressiveness – injured rabbits) are higher than the advantages (higher moving possibility, more social contacts). According to several results, the optimal stocking density is 16-18 rabbits/m<sup>2</sup> (40-45 kg rabbits/m<sup>2</sup>), depending on the final weight. Deep litter is unfavourable because of the high contamination with coccidiosis (higher mortality), lower productive and carcass traits and less preferred than wire net. There are no differences in productive performance, carcass traits and frequency of behavioural patterns of rabbits housed on wire net or plastic net floor, but at younger age growing rabbits prefer staying on plastic net. It could be important to test other types of wire net floors. A good combination of deep litter and wire net could be a pen with elevated platform and straw litter on it (the lower level is wire net). Growing rabbits prefer staying in cages with top than in open top ones. It seems that the generally used 30-35 cm high cages are suitable for growing rabbits. Environmental enrichment is important against the barren housing. Gnawing stick made of soft wood (little-leaf linden), fixed on the cage wall at similar height as the rabbits head are the most effective against to aggressiveness (lesions on the body).

including the 3'-untranslated region, and part of the introns, revealed 4 single nucleotide polymorphisms (SNPs). Two of them (g.446T>A and g.516C>T) were genotyped by PCR-RFLP in more than 200 animals of different breeds and within a commercial population. The second SNP (g.516C>T) showed a higher level of heterozygosity and will be analysed in a larger number of rabbits of the commercial population to evaluate its association with production traits.

## EFFECT OF WEANING DIET ON LACTATING RABBIT DOES

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In a feeding system with a common weaning diet for female and litter from 17 d of lactation to weaning (28 d), the effects of i) replacing starch by acid detergent fiber (ADF), ii) replacing starch by pectins and iii) reducing the crude protein (CP) content, on milk yield and body condition of rabbit does were studied with 8 experimental diets over 318 reproductive cycles from 136 females. The replacement of starch by ADF increased the feed intake (+6.7%;  $P<0.001$ ), while replacing starch by pectins or reducing CP reduced it (-8.3 and -6.1%, respectively;  $P<0.001$ ). The three dietary strategies affected negatively the performance of lactating rabbit does, reducing milk yield (-4.8, -8.7 and -7.9%;  $P<0.01$ ) and impairing some traits of the body condition (higher reduction of body weight and/or estimated body energy between 17 and 28 d).

## EFFECT OF STARCH SOURCE ON GROWTH PERFORMANCE AND INTESTINAL HEALTH

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Three diets with raw wheat, boiled wheat and boiled rice as main source of starch were formulated. Forty two and 87 rabbits weaning rabbits of 25 d of age were blocked by litter and assigned to the three diets to determine faecal and ileal digestibility of DM and starch. Ninety nine rabbits weaned at 25 d of age were blocked by litter and assigned to the three diets. Animals were housed individually and fed with the experimental diets during a 14-d period after weaning. After that (at 39 d of age), all the animals received a commercial feed until 60 d of age. For mortality, an additional group of 284 rabbits weaned at 25 d of age were blocked by litter, caged in groups of four animals and assigned to the treatments. Heat processing of wheat increased starch ileal

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## ORAL COMMUNICATIONS

### INVESTIGATION OF MYOSTATIN GENE IN DOMESTIC RABBITS AND IDENTIFICATION OF USEFUL SNPs FOR ASSOCIATION STUDIES WITH PRODUCTION TRAITS.

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In this study we investigated the myostatin (MSTN) gene in the domestic rabbit. Sequencing of the 3 exons,

( $P < 0.05$ ) and faecal ( $P = 0.090$ ) digestibility compared to raw wheat (by 1.9% and 0.9%, respectively). Boiled rice reduced ileal ( $P < 0.05$ ) and faecal ( $P = 0.090$ ) starch digestibility compared to boiled wheat (by 4.5 and 1.3%, respectively), but show a similar ileal and faecal digestibility than raw wheat. Rabbits fed boiled rice showed an intermediate value for villus height between suckling and wheat fed rabbits, but the high crypt depth observed for this treatment lead to a similar value of the ratio villus height/crypt depth. However, these effects did not affect growth performance or mortality. In conclusion, the use of heat processed wheat or boiled rice do not improve the results obtained with raw wheat.

### USE OF MANNAN OLIGOSACCHARIDES IN ALTERNATIVE TO ANTIBIOTICS IN RABBIT: EFFECT ON IN VIVO PERFORMANCE

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Four groups, each consisting of 48 weaned (35 d) hybrid Grimaud rabbits were fed ad libitum the same commercial diet supplemented, respectively, with antibiotics (AGP group: colistin sulphate 144 mg/kg; tylosin 100 mg/kg and oxytetracyclin 1000 mg/kg) or with mannan oligosaccharides (MOS) at 0.5, 1.0 and 1.5 g/kg. Up to 56 d, mortality rate was recorded daily. The rabbits were controlled weekly for live weight to calculate daily weight gain (DWG). Feed intake was measured at the end of the trial as an average per group. No differences were found for live weight, DWG and mortality rate during the trial. However, rabbits fed MOS showed a lower feed intake and feed conversion ratio than rabbits fed AGP, indicating a possible positive effect of mannan oligosaccharides on the nutrient uptake from intestine.

### DIGESTIBLE FIBRE LEVEL AND PROTEIN SOURCE IN DIETS FOR GROWING RABBITS.

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To evaluate the effect of digestible fibre (DF) (1.0, 1.1, and 1.2) and protein source (soybean and sunflower meals) on health status, digestive physiology, growth performance, and carcass traits, 216 rabbits were fed from 34 d until slaughter (76 d) six diets formulated according to a bi-factorial arrangement (3 DF to ADF ratios by 2 protein sources). Health status was good

in all experimental groups. Increasing DF to ADF ratio increased dry matter digestibility (55.4 to 58.3 to 61.3%;  $P < 0.001$ ) and improved feed conversion (3.56 to 3.42 to 3.31;  $P < 0.001$ ) without affecting caecal fermentation, carcass traits and meat quality. Sunflower meal was proved to be a protein source suitable to fully replace soybean meal in growing rabbit feeding.

### USE OF PFGE TO STUDY THE EPIDEMIOLOGY OF *STAPHYLOCOCCUS AUREUS* INFECTIONS IN RABBIT.

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To estimate the role of 13 *Staphylococcus aureus* virulence genes (bbp, cna, fnb A, fnb B, fib, clf A, clf B, ebp S, eno, bap, ica A, ica D, selm) and of the flank DNA sequence, 72 *S. aureus* strains originating from 8 rabbit farms of known staphylococcosis anamnesis were genotyped by PFGE and PCR. Results were related with the biotype, the commercial source of breeders and the staphylococcosis anamnesis. *S. aureus* isolates were classified in 5 different PFGE clusters: cluster A and D contained strains belonging to mixed CV-C biotype isolated from farms without staphylococcosis; cluster B and E contained strains belonging to mixed CV-C biotype isolated from farms with heavy staphylococcosis; cluster C contained human biotypes isolated from farms without clinical problems. In farms affected by heavy staphylococcosis two different virulence genes profiles were detected: bbp- flank- cna+ fnbB- in the cluster B and bbp+ flank+ cna+ fnbB- in the cluster E.

### GENOTYPIC CHARACTERIZATION OF *STAPHYLOCOCCUS AUREUS* ISOLATED FROM RABBIT

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In order to establish whether certain genes are usable as pathogenic markers of *Staphylococcus aureus* isolates from rabbit, 87 rabbit strains of *S. aureus* (43 belonging to the human biotype and 44 to the mixed CV-C biotype) and 35 strains collected from human patients (10 strains belonging to the mixed CV-A biotype and 25 to the human biotype) were PCR tested for 13 genes coding for virulence factors and for the flank DNA sequence. Results demonstrated that in *S. aureus* rabbit isolates

bbp, selm and flank are more frequent in mixed CV-C biotype than in the human one (respectively  $P=0,004$ ,  $P=0,003$  and  $P<0,001$ ). Bap is absent in rabbit *S. aureus* strains and fnb B is more frequent in the human biotype than in the mixed CV-C biotype ( $P<0,001$ ). 79.5% of rabbit mixed CV-C biotypes hold bbp, selm and flank genes as well as 51% of rabbit strains belonging to the human biotype. *S. aureus* strains possessing the bbp and selm genes and the flank sequence were also detected in *S. aureus* isolated from human patients and belonging to mixed CV-A (20%) or human biotype (36%).

#### **ANTIMICROBIAL RESISTANCE PROFILES AND DETECTION OF CLASS 1 AND 2 INTEGRONS IN ESCHERICHIA COLI ISOLATES FROM LAGOMORPHS. PRELIMINARY RESULTS.**

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In 118 *E. coli* isolates from commercial meat rabbits affected by enteropathy (25 isolates), wild rabbits (40 isolates), and hares (53 isolates), antibiotic resistance profiles and class 1 and 2 integrons have been investigated. 64% of isolates from meat rabbits, 40% from wild rabbits and 7,5% from hares showed multidrug resistance to more than 9 antibiotics. In 23% isolates, only class 1 integrons have been detected with a prevalence higher in meat rabbits (52% positive isolates), followed by wild rabbits (25%) and hares (7.5%). The presence of integrons in isolates from commercial meat rabbits could be due to the selective pressure produced by the large use of antibiotics during their husbandry, favouring the emergence of resistant microbial populations. In wild rabbits, antibiotic resistant isolates could be resulted from contacts with zootechnical manure dispersed on crops, whereas those from hares could have an environmental origin. Class 1 integrons have not ever been described in wild lagomorphs.

#### **SEROLOGICAL PREVALENCE OF ENCEPHALITOOZON CUNICULI IN INTENSIVE FARM RABBITS**

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Rabbit sera (n=400) from 20 commercial farms were submitted to a serological screening for *Encephalitozoon cuniculi* by a carbon immunoassay (CIA test). Antibodies anti-*E. cuniculi* were found in 126/400 (31.5%) sera analysed and all the farms (100%) resulted positive. Rabbits older than 4 mo showed a significant higher seropositivity for *E. cuniculi* (chi-squared test:  $P<0.0001$ ) than rabbits under 4 mo, *E. cuniculi* sero-prevalence showed an increasing trend in rabbits within the farm along with the increase of "no. of rabbit housed", this trend, however, was not significant (Spearman's correlation:  $P=0.073$ ). The findings of the present study confirms rabbit as main reservoir of *E. cuniculi*; they are of epidemiological relevance and immediate public health importance because of the recognized infectivity in humans by the microsporidium.

#### **PARASITIC INFECTIONS IN RABBIT INTENSIVE FARMS: WHAT'S NEW?**

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There is an increasing need to monitor infectious and parasitic diseases of rabbits (*Oryctolagus cuniculus*) due to their zootechnical value. The present paper was undertaken to evaluate the parasitological situation in rabbit intensive farms in the Campania region, southern Italy. Between November 2008 and February 2009, ten commercial meat rabbit farms were investigated. The farm management was intensive and the number of rabbits in each farm ranged from 450 to 2000. In each farm, 15 faecal samples were collected. All faecal samples were examined by the Flotac double technique. The results showed the presence of *Passalurus ambiguus* and *Eimeria* spp. in all the farms examined. The *Eimeria* species isolated from the rabbit farms were *E. magna* (100%), *E. media* (70%), *E. perforans* (80%), *E. coecicola* (30%) and *E. irresidua* (10%).

#### **ENCEPHALITOOZONOSIS OF RABBITS: THE RELATIONSHIP BETWEEN MACRO-MICROSCOPIC KIDNEY LESIONS AND ANTIBODY TITERS IN RABBITS AT SLAUGHTERHOUSE.**

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Encephalitozoonosis is a chronic parasitic infection caused by *E. cuniculi*, largely diffused in industrial rabbit farms in Italy. From 107 meat or adult rabbits taken at slaughterhouse, we sampled the kidneys and the blood in order to correlate macroscopic and microscopic lesions to anti-*E. cuniculi* antibodies determined using Carbon Immuno Assay (CIA) test. Over 85% of rabbits with lesions scoring from 1 to 4 resulted seropositive whereas only 12% of the animals without kidney lesions were positive. A good correlation was found between serological titers, ranging between 1/40 to 1/5120, and severity of lesions. The microscopic lesions reflected the severity of the infection, thus making possible a graduation system on the base of the various changes observed in the glomeruli and in the tubuli.

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## POSTERS

### EFFECT OF REPRODUCTIVE RHYTHM ON QUALITATIVE CHARACTERISTICS OF NEST STRUCTURE.

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Qualitative characteristics of nest structure in rabbit does submitted to different protocols based on standard (Control: 11 d *post-partum*) or Conditioned reproductive rhythm (AI only when the does reach a certain perirenal fat depot weight) were compared. Pluriparous does of the Conditioned group had higher live born and point for fur placement in the nest ( $P < 0.05$ ), and good placentophagia ( $P < 0.05$ ) reflecting the good body condition. Same cases of kit placement out of nest was recorded only in Control group. Group and kindling order affect both the total quality of nest with higher score in Conditioned group ( $P < 0.05$ ,  $P < 0.01$ ; respectively). In conclusion a reproductive rhythm based on good body condition positive affect the performance and the maternal behavior of rabbit doe.

### EFFECT OF DIETARY PROTEIN CONCENTRATION ON BLOOD UREA LEVEL AND REPRODUCTION EFFICIENCY OF THE LACTATING RABBIT DOE

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In an effort to sustain optimum milk production and overlapping pregnancy, rabbit meat producers often increase nutrient density of rabbit does. This situation may lead to protein intakes in excess of requirements and hypothetically can be associated with a decline in fertility. The effect of dietary protein level on plasma urea nitrogen concentrations (PUN) and reproduction efficiency was assessed through a trial involving 90 multiparous hybrid rabbit does at the same pregnancy stage. At d 27 of pregnancy, the animals were equally divided into 2 experimental groups fed on mixture at different protein levels: 18.5% (CP18.5=45) and 22% (CP22=45) on d.m. Blood samplings (=90) were performed at the same day of AI (12 d *post partum*) and plasma was assayed for PUN. Reproduction efficiency was evaluated by abdominal palpation 12 d after AI to determine the pregnancy rate (PR). CP22 rabbits exhibited significantly higher PUN levels compared to CP18.5 (34.06 vs 24.64;  $P < 0.01$ ). Moreover, PUN concentrations above 30 mg/dl have been associated with reduced fertility: PR increased when does were fed a diet not exceeding in protein content (78.1 vs 69.3 % for CP18.5 vs CP22;  $P < 0.01$ ). The results indicate that high dietary CP may exert an adverse effect on reproduction efficiency by elevating PUN levels in the lactating rabbit doe. Further research is necessary to elucidate how ammonia, urea and some other toxic product of protein metabolism may intercede at one or more steps to impair conception and the establishment of pregnancy.

### EFFECT OF COMBINED TREATMENT WITH GNRH AND A NON-SELECTIVE INHIBITOR OF PHOSPHODIESTERASE (IBMX) ON THE FERTILITY OF RABBIT DOES

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The aim of the present study was to investigate whether the addition of a non-selective inhibitor of phosphodiesterase (3 isobutyl-1-methylxanthine, IBMx) to GnRH during artificial insemination (AI) could improve reproductive performances of rabbit does. Two series of experiments were carried out in nulliparus (n=120) and multiparus (n=120) rabbit does which were divided in three groups (n=40). The first group (C) received i.m GnRH plus 1 mL saline, the second group (A) received i.m. GnRH plus 50µg IBMx and the third group (B) i.m. GnRH plus 500µg IBMx. Two hours after AI serum was collected for progesterone determination. Seventy two hours after AI six multiparus animals per group were euthanized and their ovaries were preserved

for histological analyses. Both pregnancy and birth rates were significantly higher ( $P<0.05$ ) in nulliparus does that received treatment with IBMx (A: 94.7% and 89%; B: 92.5% and 87.5%) than controls (75% and 70%, respectively). Significant difference for litter size of young does was detected between control ( $8.57\pm 0.477$ ) and treated groups (A:  $9.97\pm 0.425$  and B:  $10.34\pm 0.425$ ,  $P<0.05$ ). A significant difference ( $P<0.05$ ) was also detected for progesterone levels between control and group B ( $5.96\pm 1.15$  vs.  $9.15\pm 1.15$  ng/mL, respectively). In multiparus does, the number of primary follicles was significantly greater in group B than C ( $17.25\pm 2.8$  vs.  $7.2\pm 2.8$ ,  $P<0.05$ , respectively). In view of their marked synergism with hormones that signal through cAMP, phosphodiesterases inhibitors may be used to improve ovulation rate as part of an assisted reproduction technology protocol.

#### **EFFECT OF MICROCLIMATIC CONDITIONS ON WELFARE OF RABBITS TRANSPORTED TO THE SLAUGHTERHOUSE.**

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To evaluate the effects of crate position on the truck, a total of 384 rabbits (82 d old) were subjected to summer and winter journeys (100 min.). At each session, 96 animals were distributed at random in 8 crates on the same side of the truck (12 animals per cage) as follows: 24 animals in 2 top front (TF) crates, 24 animals in 2 bottom front (BF) crates, 24 in 2 top rear (TR) crates and 24 in 2 bottom rear (BR) crates. In the middle of TF, BF, TR and BR crates four data-loggers were placed for temperature ( $T^{\circ}$ ) and relative humidity (%RH) measurement. In summer and winter, TR position (top rear) on the truck, was characterized by the highest  $T^{\circ}$  and, particularly in summer, by the lowest RH ( $P<0.01$ ). In winter, BF showed the lowest  $T^{\circ}$  ( $P<0.05$ ) and the highest RH ( $P<0.01$ ). Despite of different environmental conditions in the different positions no effects on stress parameters and have been observed but rabbits transported in summer have resulted more stressed than in winter.

#### **CHARACTERIZATION OF CLOSTRIDIUM PERFRINGENS CPB2 GENE IN RABBIT STRAINS.**

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In commercial rabbitries, enteritis due to bacteria belonging to the genus *Clostridium* are considered a major cause of economic losses. Among this genus the role played by *C. perfringens* is still under debate. Recently, the b2 toxin, associated to enterotoxaemia in swine, horses and cattle, was described in *C. perfringens* rabbit isolates. Two cpb2 alleles, cpb2<sup>con</sup> and cpb2<sup>aty</sup>, were reported in association with enteritis in several animals. To our knowledge no data are available for rabbits. In this paper we report the detection of the two allelic forms of the cpb2 gene in 56 strains of *C. perfringens* isolated during enteritis in rabbits. Results indicate that 94 % of strains harbour the cpb2<sup>con</sup> variant with a uniform distribution of toxin-types and cpb2 alleles in the same animal.

#### **PULMONARY DISPOSITION STUDY OF TILMICOSIN (PULMOTIL AC, ELANCO) AFTER REPEAT ORAL BOLUS ADMINISTRATION TO RABBITS.**

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Two groups of four non-infected New Zealand rabbits, received tilmicosin (TIM) by oral gavage at 12.5 mg/ Kg of body weight, daily, for 2 and 5 consecutive days, respectively, while three groups of four rabbits received the same dose of TIM for 7 d. Two hours after the last dose, all rabbits from groups treated for 2, 5 and 7 d were sacrificed. Other two groups treated for seven days were sacrificed during the 1<sup>st</sup> d and the 3<sup>rd</sup> d of withdrawal. At each time of sacrifice, plasma samples, alveolar macrophages (PAM) obtained by bronchoalveolar lavage and lung tissue were collected from each animal. TIM concentrations in PAM were calculated based on the macrophage cell volume. Mean tilmicosin concentrations in lung tissue and PAM were high in TIM-treated animals, already at the second day of treatment, exceeding concurrent plasma levels by 7 and 400-fold, respectively. Among the different days of sacrifice, the highest concentrations were found at the 3<sup>rd</sup> d-treated animals. TIM concentrations declined in plasma and lung tissue to significantly lower level already at the first day of withdrawal, while PAM concentrations remained high also after three days of withdrawal. In conclusion, after daily dosing TIM showed prominent accumulation in lung tissue and PAM, already from the second day, with by far lower concentrations in plasma, as expected for a macrolide compound.

## PRELIMINARY INVESTIGATION ON THE DIFFUSION OF TRICHOPHYTON MENTAGROPHYTES IN INTENSIVE REARING RABBIT SYSTEM

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A study was carried out to determine the diffusion of dermatophytes in 205 rabbits from 5 intensive rabbit farms. Mycological results showed that most of the farms (3/5) were infected by *Trichophyton mentagrophytes* which was the only isolated dermatophyte. In infected farms, infection rates were ranging from 66.6% (n=1) to 100% (n=2) with a total prevalence of 94%. Moreover, cases of zoonotic transmission were recorded. Healthy carriers were detected in 87% of the apparently non-infected rabbits. There was no statistically significant association between prevalence of *T. mentagrophytes* and sex, age, clinical signs, presence of dogs, cats and/or other animal species in the farm, wild rodents entering the buildings, nutrition, and attempts of environmental disinfections. Once in a breeding, ringworm is very difficult to eradicate due to the presence of optimal environmental conditions for survival of *T. mentagrophytes* infective arthrospores inside rabbit farms. Since very often it is a new animal which introduces *T. mentagrophytes* infection in a farm, it is crucial to prevent the introduction of the infection by adopting the best hygienic - sanitary conditions and producing ringworm free breeders.

## EFFECT OF STOCKING DENSITY ON MEAT QUALITY OF SLOW GROWING RABBITS REARED OUTDOOR.

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The aim of the study was to investigate the effects of different stocking densities on some meat quality traits of slow growing rabbits reared outdoor. At 49 d old sixty rabbits were transferred in cages outdoor and randomly

assigned to three different housing conditions: 0.063 mq/rabbit, 0.188 mq/rabbit and 0.375 mq/rabbit. A sample of twelve animals per group was slaughtered at 101 d old and pH, meat colour and cooking loss of *B. femoris* and *L. lumorum* were evaluated. The data were analyzed by ANOVA, considering the stocking density as categorical variable. Stocking density affected some meat quality characteristics: *B. femoris* of animals reared with 0.188 and 0.375 mq/rabbit density showed a lower lightness than the other group (51.35 and 52.33 vs 55.01;  $P < 0.01$ ) and *L. lumorum* of rabbits reared with the lower density (0.375 mq/rabbit) showed higher a\* value than the 0.063 mq/rabbit (2.90 vs 1.60;  $P < 0.05$ ). It is possible that the higher disposable space induced greater physical activity, increasing muscle oxidative metabolism and consequently inducing more coloured meat. Outdoor rearing of rabbits at low density seems to be able to satisfy ethical concern of modern consumer, because assures the physiological requirements of rabbits and produces good meat quality.

## EFFECT OF PRESLAUGHTER TRANSPORT DURATION AND CRATE HEIGHT ON RABBIT MEAT QUALITY.

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A study was conducted to determine the effects of limited journey duration (1 vs. 3 h) and crate height (23 vs. 35 cm) on physiological indicators of animal welfare, slaughtering traits and meat quality using a total of 60 rabbits. The rabbits transported for 3 h exhibited higher live weight loss, while carcass yield was not influenced by journey duration. Transportation of rabbits for 3 h also determined higher ultimate pH values of both *L. lumorum* muscle (5.69 vs. 5.57;  $P < 0.01$ ) and liver (5.96 vs. 5.90;  $P < 0.05$ ), as well as a darker colour of *L. lumorum* (55.6 vs. 57.7,  $P < 0.05$ ) in respect with those transported for 1 h. Crate height did not modify carcass yield and overall product quality traits. Finally, physiological parameters (serum corticosterone and lysozime) were not affected by transport conditions.

