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ABSTRACTS OF THE 43RD SYMPOSIUM ON CUNICULTURE, ASESCU

Calamocha, Spain, 30th-31st May, 2018.

The 43rd Congress of the Spanish Association of Cuniculture (ASESCU) was held in Calamocha (Teruel province, Aragon region, Spain) from 30th to 31st May 2018, hosted by the Cooperative Society "Esperanza del Jiloca" (CEJI) and the City Council of Calamocha. The three main talks focused on strategies against antibiotic resistance in rabbit farming: one explaining the relevance of this problem and the responsibility of each agent to improve it, another expounding the "Spanish National Plan against Antibiotic Resistance", and the third showing the first milestones reached in reducing antibiotic use on rabbit farms. Specific sessions were devoted to explaining the outcomes of the three research projects supported by the partnership between the Spanish Institute of Agricultural Research (INIA) and the Rabbit Meat Marketing Board (INTERCUN): one related to welfare and health of rabbit does under different housing systems, the second devoted to the prevention and control of rabbit viral diseases, and the third investigating the etiopathogeny and control of epizootic rabbit enteropathy. In addition, the role and operation of INTERCUN was highlighted. The Chair of ASESCU spoke about this association's role in the IDCURA project, a working group focused on innovation and divulgation in reducing antibiotic use in rabbit farming. The closing speech explained the workings of LONCUN, the latest reference market for benchmark prices of rabbit meat activated in Spain. Moreover, a total of 20 communications were presented both in working sessions with oral messages and posters (nutrition, pathology, biosecurity and sustainability, housing and welfare, and reproduction and genetics). The meeting was attended by more than 210 participants from several European, American and African countries. Abstracts of the contributions presented are reported below.

MAIN PAPERS

SPANISH NATIONAL PLAN AGAINST ANTIBIOTIC RESISTANCE: CHALLENGES AND ADVANCES IN RABBIT FARMING

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Antibiotic Resistance is one of the greatest challenges in the EU and worldwide. According to the WHO, antibiotic resistance has already reached alarming levels in many parts of the world. In 2014, the AEMPS promoted the creation of a strategic plan of action to reduce the risk of selection and dissemination of antibiotic resistance, mobilising all the professionals involved and complying with the requirements of the European Commission. That is how the National Plan against Resistance to Antibiotics (PRAN) came into being. The PRAN is at the end of its first phase (2014-2018) and the schedule for the second edition (2018-2022) is being developed. The initiative involves more than 250 Spanish experts in human and animal health and is structured in 6 strategic lines. Spain, in the last ESVAC report, published in October 2017 and corresponding to the sales of veterinary antibiotics in 2015, presented a total consumption of 402 mg/PCU, being the country with the second highest level of sales. Taking into account the multi-resistance profiles, Spain is among the 10 countries with the highest number of multi-resistant strains for the bacterial species analysed, particularly in the turkey and swine sectors. Taking into account the situation of the swine sector regarding the consumption of antibiotics, especially colistin, the representatives of the national associations of veterinarians and swine production sector professionals, summoned by the Coordination Unit of the PRAN, drafted the Agreement for the Voluntary Reduction of Colistin Consumption in the Swine Sector in Spain, which was

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released in 2017. After analysis of the initial phase of the Agreement (data 2015, 2016 and first semester of 2017), it can be observed that colistin consumption decreased from 51.09 mg/PCU in 2015 to 9 mg/PCU in 2017, which means a reduction in consumption of 82.37%. Consumption of neomycin (possible alternative to the use of colistin) has also undergone a notable decrease: from 38.83 mg/PCU in 2015 to 14.81 mg/PCU in 2017. However, consumption of apramycin (possible alternative to the use of colistin) has remained relatively constant, with a small increase of 0.5 mg/PCU, which indicates that monitoring of consumption should be maintained. In view of the success achieved with the Swine Sector Agreement and after evaluating the status of the rabbit farming sector in terms of antibiotic consumption, both quantitatively and qualitatively, within the PRAN framework along with the representatives of Spanish rabbit farming, the decision was taken to draw up a Collaboration Agreement to Reduce the use of Antibiotics in this sector (ARAC). This agreement would facilitate the rabbit sector's inclusion in the "Reduce Programmes" that are also being applied in other livestock sectors (poultry, cattle, sheep and goats).

PRUDENT USE OF ANTIBIOTICS IN RABBIT FARMING. IS THERE ANOTHER WAY TO DO IT?

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Antibiotic resistant bacteria ("superbugs") are currently the most important issue in human health. As technicians and rabbit farmers, we are committed to minimising this situation, producing animals for human consumption with minimal antibiotic use. In rabbit breeding, decreasing the use of antibiotics is not an easy task: ERE, as well as the incidence of bacterial diseases, which are highly resistant to treatments (*E. coli* enteritis), inevitably makes the solution multi-factorial: farm-health check lists, biosafety, prophylaxis and feed restriction in growing are essential tools to cut down the prescription of antibiotics. Is it possible to produce rabbits with fewer antibiotics? Yes, but… in a different way.

PREVENTION AND CONTROL OF RABBIT VIRAL DISEASES

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This work summarises the activities carried out under the CUN2014-00007-00-00 project funded by INIA-INTERCUN, whose purpose is to contribute to the development of new measures for the prevention and control of myxomatosis and rabbit haemorrhagic disease. Regarding myxomatosis, vaccinations and experimental infections have been carried out to analyse different serological parameters that may provide information on the level of protection of animals immunised with homologous vaccines. In addition, recombinant myxoma viruses are being constructed, attenuated in a targeted manner, to produce a new bivalent labelled vaccine against myxomatosis and the new RHD. Concerning rabbit haemorrhagic disease, research has focused on the validation of a rapid differential diagnosis system that makes it possible to pinpoint, at the farm, the type of virus responsible for each outbreak, allowing immediate decisions on the vaccine to be used.

WELFARE AND HEALTH OF RABBIT FEMALES

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The productivity, health, welfare, management and technical-economic indexes were compared with 90 rabbit does allocated individually to three different cages, during their productive life or up to five parturitions. Data from 393 parturitions and 464 growing cages were recorded. According to provisional results, there were no great differences between cages, but the use of a platform improved the stress and hygienic conditions and affected the health of animals, especially the pododermatitis incidence. The higher cage dimensions showed some improvement in productivity, welfare and motivation of rabbit does, probably related to the space available for animals.

NUTRITION

EFFECT OF THE LEVELS OF LYSINE, SULPHUR AMINO ACIDS AND THREONINE IN DIETS FOR RABBITS WITH HIGH GROWTH RATES

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The reduction of the protein levels in diets for growing rabbits, with some signs of the possible presence of some limiting amino-acid (AA), makes it necessary to review the inclusion levels of lysine (Lys), sulphur AA (sAA) and threonine (Thr) in diets for high growth rate rabbits. In a previous experiment, it was found that the AA combination that showed the lowest plasmatic urea nitrogen concentration contained 7.3, 6.0 and 5.3 g/kg of Lys, sAA and Thr, respectively (12.96±0.45 mg/dL). The aim of this trial was to compare the growing performance obtained with this AA combination (MAB diet) and following current recommendations (MMM diet), using 126 animals from line R of the UPV. Animals fed with MAB diet showed better average daily gain and feed conversion ratio than those fed MMM diet ($P<0.05$). These results would indicate that, for animals with high growth rate, the dietary level of sAA should be increased (to 6 g/kg) and that of Thr (to 5.3 g/kg).

DO HIGH GROWTH RATE RABBITS PREFER DIETS RICHER IN AMINO ACIDS THAN THOSE RECOMMENDED?

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Current recommendations on limiting amino acids for growing rabbits lead to reduced amino acids retention (less than that expected) in high growth rate animals. In a previous trial, it was estimated that an increase of up to 15% in these amino acids could solve this deficit in high growth rate periods. The aim of this trial was to study the ability of growing rabbits, with high growth rate, to choose between diets differing in their amino acids content to fit their needs. A total of 58 weaned rabbits from R line (selected for growth rate during the fattening period), individually housed, were used from 28 to 63 d of age. Two diets were offered to each animal *ad libitum* in a choice-feeding trial: diet M with the current recommendations for lysine, sulphur amino acids and threonine (7.3, 5.2 and 6.2 g/kg, respectively) and diet H with up to 15% more of them (8.5, 6.0 and 7.1 g/kg, respectively). Growing rabbits from R line preferred the diet H (+40% feed intake compared to M diet; $P=0.06$), especially those rabbits with a high growth rate (more than 53.5 g/d of daily gain), which showed a high preference for diet H (+66%). These results would indicate that the growing rabbit seems to have the ability to choose between diets differing in their amino acid content, and that animals with high growth rate would need more of some of these limiting amino acids.

EFFECT OF DIETARY SOLUBLE AND INSOLUBLE FIBRE ON FAECAL DIGESTIBILITY AND GROWTH PERFORMANCE IN GROWING RABBITS

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The aim of this work was to study whether the effect of dietary level of soluble fibre (SF) on faecal digestibility and growth performance depended on the level of insoluble fibre (IF) in rabbits. To this end, diets were formulated according to a 2×2 factorial design, with 2 levels of IF [31.4 *vs.* 39.3% neutral detergent fibre, on dry matter (DM) basis] and 2 levels of SF (8.7 *vs.* 12.7% DM). A total of 224 non-medicated rabbits (56/diet) were used. As expected, the increase in the level of dietary insoluble fibre reduced DM and gross energy digestibility by 12%, while the increase in soluble fibre increased these digestibilities by 3%. Faecal protein digestibility was reduced by 4% by increasing insoluble fibre ($P<0.001$), but an insoluble fibre×soluble fibre interaction ($P=0.018$) was also observed because the increase in soluble fibre exerted a positive effect when combined with low insoluble fibre, although this effect was negative when the level of insoluble fibre was high. This meant that when the level of insoluble fibre was increased, the content of digestible energy, digestible protein and digestible protein/energy ratio were reduced ($P<0.001$), with an insoluble fibre interaction×soluble fibre ($P=0.012$) being observed in all cases due to the negative effect on these variables of the combination of high insoluble and soluble fibre values. Treatments did not affect mortality (<1%). The increase in soluble and insoluble fibre tended to reduce growth rate throughout the fattening period ($P=0.11$), with no interaction between them. As expected, the increase in dietary insoluble fibre increased feed intake and worsened the feed efficiency ($P<0.001$), whereas the increase in soluble fibre only reduced feed intake ($P=0.048$). In conclusion, increasing the level of soluble fibre when there is no incidence of enteropathy impaired the growth performance in rabbits.

EFFECT OF DIETARY SOLUBLE AND INSOLUBLE FIBRE ON BODY AND CARCASS COMPOSITION AND ON NITROGEN AND ENERGY BALANCE IN GROWING RABBITS

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The aim of this work was to study whether the effect of dietary level of soluble fibre (SF) on body and carcass composition, energy and nitrogen balance of rabbit performance depends on the level of insoluble fibre (IF). Four diets were formulated according to a 2×2 factorial design with 2 levels of IF [31.0 *vs.* 39.0% neutral detergent fibre, on dry matter (DM) basis] and 2 levels of SF (8.67 *vs.* 12.7% DM). Body composition was determined in 39 rabbits/diet by bioelectrical impedance analysis at 28 and 62 d of age. Energy retention in the body and carcass tended to reduce when soluble and insoluble fibre increased (P=0.084). The retention efficiency of digestible energy (DE) in the body and carcass tended to decrease with soluble and insoluble fibre levels, except for the group fed with the highest level of insoluble fibre and a low level of soluble fibre, whose efficiency was much lower than that obtained with a lower level of insoluble fibre (P=0.038). This could be accounted for by their greater DE intake (P=0.033). The retention of body and carcass nitrogen was reduced with the increase in the level of insoluble fibre (P=0.044), without being affected by soluble fibre. The nitrogen retention efficiency in the body and in the carcass was similar between groups, except in those fed high insoluble fibre and low soluble fibre (P=0.061), where it was much lower, probably due to the greater digestible nitrogen intake (P<0.001). In this work, a positive effect of soluble fibre on energy and nitrogen retention efficiencies was not observed, possibly due to the good health status of the animals (mortality <1%). On the other hand, the increase in insoluble fibre worsened the retention efficiency of digestible energy in the body and carcass.

EFFECT OF DIETARY INCLUSION OF GALACTOMANNANS ON NUTRIENT DIGESTIBILITY IN GROWING RABBITS

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The aim of this work was to study the effect of fenugreek seeds gum (FSG), rich in galactomannans, on the apparent digestibility coefficients of young rabbits in 2 periods, from 38 and 56 d of age. Three experimental diets were formulated with increasing levels of the FSG: 0, 0.25 and 0.5%. The 3 diets were administered to 3 groups of 15 rabbits housed in individual cages from weaning (31 d) to slaughter (94 d). From these animals, 10 rabbits per treatment were used to estimate dry matter intake (DMI) and the apparent digestibility coefficients for dry matter (dDM), organic matter (dOM), crude protein (dCP), neutral detergent fibre (dNDF) and acid detergent fibre (dADF). There was no significant effect of FSG level on the DMI and the apparent digestibility coefficients of nutrients evaluated, but a significant increase of DMI, dDM, dNDF and dADF with age was observed (P<0.05). Nevertheless, a relevant linear increase of dADF and, especially, of dNDF was found (+2.52 percentage points per 0.5% increase in FSG; P<0.10). The results of this study show that dietary inclusion of galactomannans did not affect digestibility of nutrients evaluated, although it cannot be ruled out that it improves the digestibility of the fibrous fraction.

PATHOLOGY

NATURAL ALTERNATIVE TO PATHOLOGIC ALTERATIONS IN DIGESTIVE TRACT IN FATTENING RABBIT

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Two main public and animal health issues are the development of antimicrobial resistance and the scarcity of alternative therapies. This situation led to the development of a National Plan against Antibiotic Resistance (PRAN) with the aim of reducing the use of antibiotics. The need to study effective alternatives such as essential oils is consequently increasing. The aim of this study was to assess the antimicrobial effect of essential oils and organic acids as a possible natural alternative against pathologic alterations in fattening rabbits. The product used was ARVITAL SE®, compound form *Allium sativum, Origanum vulgare* and *Yucca schidigera* essence and organic acids (butyric, lauric, caprylic, formic, propionic and acetic acids). First, an *in vitro* research was performed to evaluate the antibacterial effect of ARVITAL SE® and 2 *in vivo* trials were subsequently designed. *In vitro* study corroborated the antibacterial effect of ARVITAL SE®. Two trials were designed to decide the most suitable dosage and protocol to administer ARVITAL SE® throughout the fattening period. In both *in vivo* studies, there was no need to add antibiotics in the experimental group drinking water.

However, the control group (no ARVITAL SE® was added in water) had to be treated with antibiotic in drinking water in both experiments. Summarising, ARVITAL SE® helps to control pathologic alterations in digestive tract of fattening rabbits without the need to administer antibiotic in drinking water. Moreover, when ARVITAL SE® is administered at low dosage throughout the fattening period, average daily gain is improved.

IMPACT OF HOUSING ON RABBIT DOES' HEALTH

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Welfare in animal production is increasingly concerning society and is closely related to the good performance of these animals. Housing is a very important factor for well-being, but there is insufficient scientific evidence regarding the best type in rabbit breeding. Therefore, in this work the immune status and doe morbidity and mortality are studied in 5 different types of cages: polyvalent cage; highest and deepest cage; cage with platform; classic cage (smaller and lower); and collective for 6 females. The collective housing was found to cause an increase in haptoglobin levels at the end of the experiment and a greater number of eliminations compared to the other housings.

EVALUATION OF THE EFFECT OF AN EXPERIMENTAL INFECTION IN COMMERCIAL RABBITS WITH DIFFERENT STRAINS OF *STAPHYLOCOCCUS AUREUS*: PRELIMINARY RESULTS

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Staphylococcus aureus is a bacterium able to survive in a variety of environments and cause different types of lesions in both humans and animals. It can affect rabbits of different ages and develop suppurative lesions. An experimental infection was designed in order to compare lesions and immune response developed by the animal after intradermal inoculation using several *S. aureus* strains. One hundred per cent of the animals infected with the ST121 strain isolated from rabbit farms developed lesions and established a potent immune response. When this strain contains the *rot* gen or with the mutation of a nucleotide in the *dltB* gene, it produces mild lesions and lower levels of granulocytes and monocytes in blood. These preliminary findings confirm that the genetic characteristics of the bacterium are essential for the development of lesions, and that *rot* and *dltB* play a part in the staphylococcal disease in rabbits.

CHARACTERISATION OF MRSA AND MSSA STRAINS ISOLATED IN COMMERCIAL RABBITS. PRELIMINARY STUDY

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Methicillin-resistant *Staphylococcus aureus* (MRSA) is a bacterium that causes serious and even deadly diseases in humans. This bacterium is traditionally associated with human origin, but has now been found associated with affecting livestock (LA-MRSA). The clone of MRSA associated with livestock is ST398, which was initially associated with swine, but was later isolated in other production animals. Previously, only one case of LA-MRSA had been reported in a rabbit production farm in Italy; the clone that was isolated on this farm was ST398, determined by MLST (Multi-Locus Sequence Typing). The objective of this work is to study the presence of resistance and virulence genes of different strains isolated from rabbits in commercial farms and characterise the phenotype of resistance to antibiotics of these strains. For this purpose, we analyse different *S. aureus* isolates obtained from different lesion types collected from Spanish and Portuguese rabbit commercial farms, detecting the methicillin-resistant gene *mec*A.

DESIGN OF A RHDV-2 PREVENTION PROGRAMME BASED ON EFFICACY OF A EUROPEAN COMMERCIAL VACCINE

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After the emergence in 2010 of the new variant of rabbit haemorrhagic disease virus (RHDV-2) in the Iberian Peninsula, the urgent need arose to develop a specific vaccine against RHDV-2 as the main tool to control the disease. The information available on the vaccine at the time of the outbreak, such as duration of the immunity generated by the vaccine, was limited. Therefore, this study aimed to evaluate the efficacy of the ERAVAC® (HIPRA) vaccination in rabbits up to 12 mo post-vaccination through serial heterologous challenges and serological response monitoring. The results obtained show that ERAVAC® induces a robust humoral response from 7 d to 12 mo post-vaccination, which is protective against virulent heterologous challenges. Therefore, it is feasible to conclude that annual revaccination against RHDV-2 in rabbits vaccinated under the described conditions would be suitable for control of the disease in field conditions.

THE STRESSFUL LIFE OF *STAPHYLOCOCCUS AUREUS*

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A major health obstacle found in rabbits was the subcutaneous abscesses caused by *Staphylococcus aureus*, which were found to be the determinant of meat condemnation. *S. aureus* is one of the prevalent agents that cause subcutaneous abscess infections, which are difficult to treat with current therapies. This research examines the relationship between the stringent stress response of *S. aureus* and the intercellular mechanisms that can cause the pathology of the abscess, such as from the bacteria and how different factors can affect the abscess pathology. This stringent stress response is activated when the bacteria found within the abscesses are under significant stress, due to limited nutrients and oxygen as well as phagocyte-generated oxidative stress. As the stringent stress response is mainly regulated by RSH enzymes, this research also describes the deletion mutant in RSH synthase in order to characterise its interaction with the immune response and the development of rabbit staphylococcal abscess.

BIOSECURITY AND SUSTAINABILITY

LIFE CYCLE ANALYSIS OF SPANISH RABBIT PRODUCTION

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Rabbit production causes environmental impacts. Management systems at farm level might have an effect on the magnitude of these impacts. The aim of this work is to estimate atmospheric impacts from rabbit meat production related to farm management. To this end, a productive model has been developed. This model allows us to determine the number of animals and feed consumption needed to achieve a productive goal, and also calculates associated gaseous emissions. Carbon footprint of representative feeds for fatteners and reproducing animals was also calculated. A slight effect was observed for environmental impacts associated with meat production according to farm management (intensive, semi-intensive and extensive). Higher productive and environmental efficiencies were achieved by intensive systems. If compared with other livestock production systems, rabbit meat resulted in higher emissions than poultry meat, but lower than from other species (swine and ruminants).

BIOSECURITY AND PRODUCTIVITY IN RABBIT FARMS

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Biosecurity measures, technical management data and medication level in reproductive females and growing rabbits (IFTAr and IFTAc, respectively) in 45 rabbitries from Catalunya were collected in 2015 through the Spanish rabbit database bdcuni. The level of biosecurity in each farm (from 0 to 10) was determined according to the biosecurity measures adopted in the farm and the level of importance of the measure, according to previous studies. Averaged biosecurity level was 5.23. Farms with high levels of biosecurity were related to better values of sold rabbits and kg of rabbits produced, low mortalities during

lactation and fattening and a low level of medication in reproductive and fattening periods.

HOUSING AND WELFARE

WELFARE AND HEALTH OF RABBIT FEMALES AND KITS HOUSED IN INDIVIDUAL CAGES OR IN COLLECTIVE SEMI-GROUP

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The welfare and health of 60 rabbit females were measured during five parturitions. Half of them were allocated to individual cages and the other half to a mixed housing system (collective cages during pregnancy and late lactation and individual cages during pre-parturition and early lactation). The hygiene conditions in the collective cages worsened, mainly because the faeces were retained in the platform, and this caused a higher incidence of all the pathologies studied in the rabbit females, especially footpad dermatitis, with 20% of these rabbit females presenting symptoms in the first litter, compared to 7% in the individual cages. From the fourth parturition, 100% of collective rabbit females had footpad dermatitis, as well as the most serious injuries, while the presence was 52% in the individual cages. Half of the rabbits from the collective cages presented some cutaneous lesion related to agonistic behaviour, and in 30% of them there were serious wounds from the first parturition. The highest levels of cortisol recorded in rabbit females' hair in collective cages would also indicate a greater degree of stress, which continued to increase until reaching values of 1.44 ng/g at fifth weaning, compared to 0.71 ng/g in individual cages.

MANAGEMENT TIME VALUATION WITH RABBIT FEMALES HOUSED IN INDIVIDUAL CAGES OR IN COLLECTIVE SEMI-GROUP

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The management routine of 60 rabbit females was measured over five parturitions. Half of them were allocated to individual cages and the other half to a mixed housing system (collective cages during pregnancy and late lactation and individual cages from near parturition to 18 d post-parturition). Insemination and palpation time, as well as nest revision time, increased by 67% in the collective system, but the cage cleaning management was the most affected for the housing system, as the cleaning frequency in collective cages was much higher (3.94 times *vs.* 0.43 times in individual cages), and the total time needed for all management monitored increased 12 times (296 *vs.* 24 s every reproductive cycle).

FEEDING DEVICE TO CONTROL INDIVIDUAL FEED INTAKE OF GROWING RABBITS RAISED IN COLLECTIVE CAGES: PRELIMINARY RESULTS

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In order to automate individual feed intake recording in animals reared in group, a feeding device has been developed. The equipment records the weight of the feed at the feeder each time the animals enter and exit the device, and the code of the radio frequency chip inserted in the animal's ear. To ensure that the device is working properly, the animals must enter the feeder individually throughout a tunnel. This design can alter the usual feeding behaviour of the rabbits. The aim of this work is to evaluate this effect on individual growth and consumption, while also trying to determine whether there is a number of animals per cage below which this effect disappears. To achieve these objectives, an experiment was carried out during two fattening batches, comprising 5 experimental groups: 2 control groups, fed with standard feeders, one allowing cage feed intake recording and the other not, and three fed with the new device, rearing 5, 6 and 7 animals per cage. The effect of the feeder on growth was clear and significant in both batches, (penalising the growth by around 4-5 g/d). A noticeable effect on the consumption was also found, but it did not reach statistical significance. The results of the first batch show how a reduction in the number of animals per cage, up to 5, eliminates the negative effect of the electronic feeder on growth. This effect was not observed in the second batch, in which the animals with the best growth were those of the group in which there were 7 per cage. Our results show that although there is a negative effect on growth, this is only slightly higher than that observed associated with the batch. The discrepancies observed between batches make it necessary to repeat the experiment.

PERFORMANCE AND BEHAVIOUR OF GROWING RABBITS REARED IN COLLECTIVE PENS WITH OR WITHOUT ENVIRONMENTAL ENRICHMENT

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The effects of an elevated platform and a plastic hiding tube on growth and behaviour were evaluated in 504 growing rabbits reared in pens in large groups (27 or 36 rabbits) from weaning (33 d) to slaughter (68 or 75 d). Rabbits kept in pens with a platform showed similar productive results during the cycle, but a higher incidence of lesions associated with aggression at the end of the cycle compared to those from pens without the platform (20.6 *vs.* 11.7%; $P<0.01$). Rabbits kept in the pens with the platform stayed on it 20.6% of the total observation time, rested more with stretched body and spent less time in allo-grooming ($P<0.001$). The presence of the plastic tube impaired daily growth rate (39.7 *vs.* 43.4 g/d; $P<0.001$) and slaughter weight (2467 *vs.* 2600 g; $P<0.01$), and had a minor effect on their behaviour.

REPRODUCTION AND GENETICS

PRODUCTIVE PARAMETERS AND KITS GROWTH FROM PRIMIPAROUS RABBITS DOES AFTER A FEED INTAKE RESTRICTION DURING PREGNANCY

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The aim of this study was to evaluate the consequences of a moderate feed intake restriction during pregnancy (40% of voluntary feed intake) in a group of 116 primiparous non-lactating rabbit does (32 d post-partum). The animals were randomly distributed in 4 experimental groups according to the duration and period of gestation at which the food restriction was applied: restricted on the first week (R07, n=30), on the second and third weeks (R721, n=28), on the first 3 wk (R021, n=29) or never restricted (control, n=29). In the last week of gestation, all animals were fed *ad libitum*. Their productive parameters and those of their offspring in the second cycle were studied and, subsequently, rabbit does were inseminated again at 11 d post-partum (3rd cycle). As results of this study it was found that, in general, the feed intake restriction had no major effect on productive parameters of restricted does compared to control ones. However, lower average daily gain (ADG) was observed during lactation in the R07 group. This group increased more uniformly than the others, although it could not compensate and reached the same final body weight as the other groups. The feed intake restriction applied during the second gestation did not affect productive results of the third cycle either. Therefore, it can be concluded that these nutritional management strategies could help to avoid the fat cover of primiparous rabbit does inseminated in extensive rhythms without detriment to their productivity in their first productive cycles.

PERSPECTIVES FOR THE USE OF MICROBIOME AND METAGENOME FOR THE CREATION OF A ROBUST AND PRODUCTIVE LINE OF RABBITS

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One of the important problems in intensive rabbit breeding is the creation of robust lines. At the Universitat Politècnica de València, a long-lived and productive line was created from descendants of females that surpassed 30 births, having an average litter size of approximately 9 live born. At the Miguel Hernández University, a divergent selection experiment was carried out on variability of litter size in successive deliveries of the female, giving rise to a homogeneous line and a heterogeneous line, the former being more robust and having better litter size than the latter. The purpose of this communication is to describe the research project that is going to be carried out with these lines with the aim of finding selection criteria for robustness that do not decrease production, in order to select a maternal line with this objective. To this end, an analysis of the microbiome of these lines is carried out.

MEAT QUALITY COMPARISON BETWEEN ALBINO AND BLACK-EYED RABBITS

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The quality of the meat of an albino line was compared with a closely related black eye colour line, with both lines reared in the same feeding and handling conditions. The fatty acid composition, the texture and the results of a sensory panel were examined. A difference was considered relevant when it exceeded 1/3 of the standard deviation of the trait. Some differences in meat quality were observed, but they were not relevant. In conclusion, to find relevant differences in quality, the mere fact of presenting a black eye is not sufficient; other parameters should be modified, such as genetic background, food or the production system.