

ABSTRACTS OF THE 40TH ASESCU CUNICULTURE SYMPOSIUM

SANTIAGO DE COMPOSTELA, SPAIN, 28TH-29TH MAY, 2015

The 40th Congress of the Spanish Association of Cuniculture (ASESCU) was held in Santiago de Compostela from 28th to 29th May 2015. This is the 40th edition of the conference, held annually without interruption since 1976. Main papers focused on analysing the current rabbit sector situation in the north-western Iberian Peninsula, genetic improvement of meat rabbit and foundation of new lines. The future of meat rabbit production and the rabbit meat production value chain was discussed, with the results of the partnership between the Spanish Institute of Agricultural Research (INIA) and the rabbit marketing board (INTERCUN) to support research projects. A round table was also held on coccidiosis in rabbit farms. In addition, a total of 32 communications were presented both in working sessions with oral communications and posters (pathology, nutrition, reproduction, ethology, production and products). The meeting was attended by more than 200 participants, including researchers from Spain, Portugal, Mexico, Ecuador and Egypt, among other countries. Abstracts of the contributions presented are reported below.

MAIN PAPERS

RABBIT PRODUCTION IN THE NORTH-WESTERN IBERIAN PENINSULA

PRIETO C., GULLÓN J., SÁNCHEZ DEL CUETO M., GARCÍA MARTÍNEZ N., GARCÍA PARIENTE C.

Cogal S. Coop. Gallega. Rodeiro. PONTEVEDRA, Spain.
carmen@cogal.net

This paper depicts the current status of rabbit farming in the northwest of the Iberian Peninsula. In this region, rabbit farming is dynamic, concerned about the industry and eager to move forward and improve. Farms seek to be competitive and farmers are demanding high quality services, both in production and commercial terms. They are aware that they have made a substantial financial investment in creating the company and should therefore make it profitable.

GENETIC IMPROVEMENT OF MEAT RABBIT. FOUNDATION OF NEW LINES

BASELGA M.

Dept. Ciencia Animal, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022 VALENCIA, Spain.
mbaselga@dca.upv.es

The most important issues in meat rabbit breeding are discussed, particularly those related to the foundation and selection of specialised lines, paternal and maternal,

to be used in a 3-way crossing scheme. Special attention is given to the analysis of different approaches to found new lines, while also commenting on selection methods and criteria and the responses obtained in different programmes. Finally, genomic selection is discussed in relation to the physiological and economical characteristics of the rabbit. It is concluded that its use is not currently possible due to the small size of the rabbit populations undergoing selection, the short generation interval, the low value of the individual rabbit and the current cost of molecular genotyping.

THE FUTURE OF MEAT RABBIT PRODUCTION: RABBIT PRODUCTION-FICTION

BUXADÉ CARBÓ C.

Departamento de Producción Agraria. E.T.S. de Ingenieros Agrónomos. Universidad Politécnica de Madrid. 28040 MADRID, Spain.

carlos.buxade@upm.es

This paper presents an analysis of the Spanish rabbit industry based on simplified application of the prospective methodology (which is defined and expounded). To contextualise it, we first analyse the current situation of the rabbit sector around the world and in the European Union, and its development in recent years. Then, we analyse the rabbit industry income in Spain from the production standpoint. This includes the current situation in the sector (production, number of farms, imports and exports, level of self-sufficiency, etc.) and its development

and contextualisation in the framework of meat production in Spain. The last part of the paper presents our sector DAFO and the main conclusions drawn, analysing the need to establish a value chain and see the consequences of the lack of prices on the rabbit meat market in Spain over the past three years.

COCCIDIOSIS IN RABBIT FARMS

BADIOLA I., ALOY N., GONZÁLEZ J., PÉREZ DE ROZAS A.

Subprograma de enfermedades endémicas, IRTA-CReSA. Barcelona, Spain.

ignacio.badiola@irta.es

Infestations by parasites of the genus *Eimeria* cause a decrease in feed intake, worsening of conversion rate, diarrhoea and a reduction in the economic balance of rabbitries. These infestations also cause imbalance of the intestinal microbiota and the development or worsening of different bacterial infections, especially colibacillosis or epizootic rabbit enteropathy. Different chemical agents, which are generally applied for almost the entire duration of production cycles, are used for their control. However, efforts must be made to find alternative products that could replace the current anticoccidials. Different plant extracts as well as different types of vaccines have been effective in other animal species.

NUTRITION

EFFECT OF FAT LEVEL AND SOURCE ON GROWING RABBIT PERFORMANCE

SAIZ A.*, NICODEMUS N.†, ALFONSO C.*, TERREROS E.‡, LIZASO J.‡, FERNÁNDEZ B.‡, GARCÍA-RUIZ A.I.*

*Poultry and Rabbit Research Centre, Nutreco, Casarrubios del Monte, 45950 TOLEDO, Spain. †Departamento de Producción Animal, Universidad Politécnica de Madrid, Ciudad Universitaria, 28040 MADRID, Spain. ‡NANTA S.A. Ronda de Poniente 9, Tres Cantos, 28760 MADRID, Spain.

a.saiz.b@nutreco.com

The aim of this study was to determine the effect of the fat level and fat source on performance and mortality of animals from 35 to 63 d of life. Six hundred rabbits weaned at 35 d were used, allocating 5 animals per cage (20 cages per treatment). Six diets were formulated, adding soybean Oil (SBO), fish oil (FO) or palm kernel oil (PKO) in 2 different levels: 1.5 and 4%. Levels of Digestible Energy, protein and ether extract were found in the diets with the same level of added fat. Feed intake and body weight from 35 to 63 were measured. The studied parameters were: body weight (BW), daily weight gain (DWG), feed intake (DFI), feed conversion rate (FCR) and mortality. A significant

effect of the fat source was found on BW₆₃ ($P=0.0019$), DWG ($P=0.00019$), DFI ($P<0.0001$) and FCR ($P=0.0181$). Rabbits fed with FO showed respectively 4.8, 7.8 and 1.1% lower BW₆₃, DWG and DFI than animals fed with SBO and PKO diets. Animals fed with FO diets showed the lowest FCR (2.330) and highest mortality (13.2%), while animals fed with PKO showed the highest FCR (2.449) and lowest mortality (6.4%). Animals fed with 4% of fat showed 5.3% and 3% lower levels of DFI and FCR. From these results it can be concluded that the source and level of fat have an effect on rabbit performance; the use of palm kernel oil could be considered as a good alternative to soybean oil; fish oil inclusion is not advisable in rabbit diets.

EFFECT OF FAT LEVEL AND SOURCE ON BODY AND CARCASS COMPOSITION OF GROWING RABBITS

SAIZ A.*, NICODEMUS N.†, ALFONSO C.*, TERREROS E.‡, LIZASO J.‡, FERNÁNDEZ B.‡, GARCÍA-RUIZ A.I.*

*Poultry and Rabbit Research Centre, Nutreco, Casarrubios del Monte, 45950 Toledo, Spain. †Departamento de Producción Animal, Universidad Politécnica de Madrid, Ciudad Universitaria, 28040 MADRID, Spain. ‡NANTA S.A. Ronda de Poniente 9, Tres Cantos, 28760 MADRID, Spain.

a.saiz.b@nutreco.com

The aim of this study was to determine the effect of the fat level and fat source on body and carcass composition and nutrient retention efficacy of growing rabbits from 35 to 63 d of life. The same diets were formulated as for the previous study presented at this Symposium. Six diets were formulated with a factorial design (3×2), using three fat sources: soybean Oil (SBO), fish oil (FO) or palm kernel oil (PKO) at 2 different levels 1.5 and 4%. Sixty animals were used, taking 10 animals per treatment group. At 35 and 63 d of life, body and carcass composition were determined by the Bioelectrical Impedance (BIA) method, obtaining by duplicate values of resistances, reactance, internal electrodes distance, animal length and weight. Nutrient retention was determined by difference between initial and final protein and energy contents of the carcasses. Digestible protein and energy intake of the animals from 35 to 63 d was controlled in order to calculate nutrient retention efficacy. No significant differences were found in any of the studied parameters. Therefore, it was concluded that the fat sources and levels of inclusion used in this study, had no effect on carcass composition or energy and protein retention.

CARCASS CHEMICAL COMPOSITION AND NUTRIENT RETENTION IN RABBITS FED WITH DIFFERENT FEEDING RESTRICTION STRATEGIES

CRESPO R.*, ALFONSO C.*, SAIZ A.*, GARCÍA-RUIZ A.I.*

TERREROS E.[†], MARCO M.[†], NICODEMUS N.[‡]

[†]Poultry and Rabbit Research Centre, Nutreco, Casarrubios del Monte, 45950 TOLEDO, Spain. [‡]NANTA SA, Ronda de Poniente 9, 28760 Tres Cantos, MADRID, Spain. [§]Departamento de Producción Animal, Universidad Politécnica de Madrid, Ciudad Universitaria, 28040 MADRID, Spain.

nuria.nicodemus@upm.es

The aim of this work was to study the effect of different feeding restriction strategies on nutrients digestibility, chemical composition of carcass, and energy and protein balance of growing rabbits. A total of 600 rabbits were weaned at 34 d of age, housed in cages (5 animals/cage) that were randomly assigned to 5 treatments. Only one diet was formulated (crude protein [CP]: 16%; neutral detergent fibre: 34%; digestible energy: 2450 kcal/kg) and supplied to 5 groups of rabbits. Control treatment animals were fed *ad libitum* and the other 4 groups were restricted at 80 and 70% of theoretical *ad libitum* intake, throughout the fattening period or until 48 d. Treatments restricted for the entire fattening period tended to have higher digestibility than those restricted until 48 d. Digestibility of the remaining nutrients was not affected by any of the strategies followed. The concentration in carcass of CP and ashes increased, whereas the concentration of ether extract and gross energy decreased in treatments restricted throughout the fattening period ($P < 0.001$). Efficacy of nitrogen retention tended to increase ($P = 0.074$) and the excretion of nitrogen and energy through the faeces and urine decreased ($P < 0.001$) in animals restricted.

EFFECT OF SOLUBLE AND INSOLUBLE FIBRE FRACTIONS OF APPLE PULP ON ILEAL AND FAECAL DIGESTIBILITY IN RABBITS

ABAD-GUAMÁN R., DELGADO R., CARABAÑO R., GARCÍA J.

Dpto. de Producción Animal. E.T.S.I. Agrónomos. Ciudad Universitaria. 28040 MADRID, Spain.

javier.garcia@upm.es

The aim of this work was to investigate the effect of soluble and insoluble fibre of apple pulp on fibre digestibility in rabbits. Four diets were formulated with similar levels of insoluble fibre (neutral detergent fibre [NDF] 32.4%) and protein (18.6%, both on dry matter basis). Control diet contained the lowest level of soluble fibre (4.6% SF, including oat hulls and straw as sole sources of fibre). A second diet was obtained by substituting 6% of the control diet starch for apple pectins (10.5% SF). Two more diets were obtained by replacing part of the fibrous sources of the control diet with either apple pulp or depectinised apple pulp (9.3 and 7.1% SF, respectively). Faecal digestibility was determined in 23 rabbits/diet from 55 to 59 d of age, and 23 rabbits/diet were slaughtered at 60 d of age to collect ileal digesta to determine ileal

digestibility. Soluble fibre from apple stimulated ileal flow of mucins ($P = 0.002$), but not at faecal level. The correction for mucins increased the digestibility of crude protein, total dietary fibre and soluble fibre at faecal, but especially at ileal level, depending in this case on the diet. Around half of the soluble fibre in diets containing any fibre fraction from apple was degraded at ileal level, with no differences among these diets (46 and 86% on av. at ileal and faecal level, respectively). Inclusion of apple insoluble fibre improved NDF digestibility at faecal ($P < 0.05$) but not at ileal level.

EFFECT OF LEVEL OF SOLUBLE FIBRE AND OMEGA-6/OMEGA-3 RATIO ON MICROBIOTA COLONISATION IN SUCKLING RABBITS

DELGADO R.^{*}, BADIOLA I.[†], ABAD-GUAMÁN R.^{*}, NICODEMUS N.^{*}, VILLAMIDE M.J.^{*}, PÉREZ DE ROZAS A.[†], MENOYO D.^{*}, CARABAÑO R.^{*}, GARCÍA J.^{*}

^{*}Departamento de Producción Agraria, ETSI Agrónomos, Universidad Politécnica de Madrid, MADRID, Spain. [†]CreSa (UAB-IRTA), BARCELONA, Spain.

javier.garcia@upm.es

The aim of this work was to study the effect of dietary soluble fibre and the n-6/n-3 ratio on milk and faecal microbiota of rabbit does and mesenteric lymph node (MLN) microbiota of suckling rabbits in the first week of lactation. To this end, a factorial design was used with 2 soluble fibre levels (7.8 vs. 14.4%) and two n-6/n-3 ratio (13.4 vs. 3.5). Twenty rabbit does (5/diet) were used. Five days after kindling milk was collected, one kit per doe was slaughtered and MLN collected and rabbit does faeces were also sampled from the nest. Microbial DNA was extracted and sequenced from these samples. Microbiota presence was confirmed both in doe milk and in MLM of suckling kits. Most of the operational taxonomic units (OTUs) detected in MLN were also found in milk and/or faeces. Milk and MLN microbiota profiles were more similar compared to faecal microbiota. The latter was influenced by the level of soluble fibre and MLM microbiota by the level of n-3 fatty acids, but this was not observed for milk. The most abundant OTUs in MLN were *Bacteroides* (8th in faeces and 51st in milk), *Pelomonas* (1st in milk), *Xanthomonas* (10th in milk), and unclassified bacteria (1st in faeces and 6th in milk). The genus *Lactobacillus* was identified in milk and MLN samples but was not observed in faeces. Treatments influenced OTUs proportion in most of the samples.

EFFECT OF LEVEL OF SOLUBLE FIBRE AND CELLOBIOSE SUPPLEMENTATION ON GROWTH PERFORMANCE IN FATTENING RABBITS

Ocasio-Vega C., Abad-Guamán R., Kimiaetalab M.V., Kühn G., Vanegas J., Delgado R., Menoyo D., Nicodemus N., Carro D., Carabaño R., García J.

Departamento de Producción Agraria, ETSI Agrónomos, Universidad Politécnica de Madrid, Spain.

javier.garcia@upm.es

The aim of this work was to study the effect of dietary soluble fibre and cellobiose supplementation in water on growth performance in rabbits. To this end, 2 diets differing in the level of soluble fibre (7.7 vs. 15.2%, on dry matter basis) and 3 concentrations of cellobiose in water (0, 0.75 and 1.5 g/L) were used. Treatments were offered to the rabbits from weaning (34 d; 781 ± 88 g; 44 rabbits/diet) to 48 d of age, when they were all fed with a standard diet and no cellobiose in water up to 61 d of age. The increase of soluble fibre reduced mortality in the 34-48 d period (16.2 vs. 7.6%. $P=0.019$), although there was no effect at the end of fattening (15.8% on av.). Cellobiose supplementation linearly increased the mortality of rabbits fed the high level of soluble fibre, both in the first or in the global period ($P=0.035$), while in rabbits fed the low soluble fibre diet the mortality tended to be lower with 0.75 g cellobiose/L ($P=0.091$). Rabbits fed high soluble fibre diet showed a lower feed intake ($P=0.014$) and tended to grow less during fattening ($P=0.067$), with no modification of feed efficiency. Supplementation with 0.75 g cellobiose/L increased feed intake, growth rate and feed efficiency in the 34-48 d period ($P \leq 0.046$), but this effect was diluted at the end of fattening period.

FEEDING PROGRAMMES PROMOTING DAILY FEED INTAKE STABILITY IN RABBIT MALES REDUCE SPERM ABNORMALITIES AND IMPROVE FERTILITY

Pascual J.J.*, Marco-Jiménez F., Martínez-Paredes E.*, Ródenas L., Martínez-Talaván A.†, Fabre C.‡, Martín E.‡, Juvéro M.A.†, Cano J.L.‡

*Instituto de Ciencia y Tecnología Animal, Universitat Politècnica de València, Camino de Vera s/n, 46022 VALENCIA, Spain. †GUCCO e INCO. Grupo Arcoiris. Ctra. de Beceite, km 23, 44580 VALDERROBRES, Teruel, Spain. ‡Innovater. C/Pedro IV, 11. 44002 TERUEL, Spain.

jupascu@dca.upv.es

The effects on semen quality and production of different dietary treatments designed to reduce feed intake variability in rabbit males for artificial insemination, as well as supplementation with a hepatoprotective, were evaluated. One hundred and seven males (1.18 yr) were assigned to one of the 4 treatments: CA, males fed *ad libitum* with diet CA (rich in starch); FS, males fed *ad libitum* with diet FS (rich in soluble fibre); males fed with diet CA daily restricted to maintenance requirements; and S, males fed *ad libitum* with diet CA supplemented with

50 ppm of silymarin. Daily weight gain (DFI) of R males was close to zero and significantly lower to the rest of groups (-1.45 g/d; $P < 0.001$). Variability of DFI was significantly lower for R males (7%) than for males of dietary treatments CA and S (on av. 13%), having FS males intermediate values (11%). Semen from R males presented lower rates of sperm abnormalities (on av. -6.2% ; $P < 0.05$). Dietary treatments addressed to reducing DFI variability (FS and R) led to an improvement of kindling to pregnant and kindling to insemination ratio compared to the other treatments ($+0.039$ and $+0.041 \pm 0.015$, respectively; $P < 0.05$).

IS THE APPLICATION OF FEED RESTRICTION AT FATTENING AN ADVISABLE MANAGEMENT STRATEGY FOR RABBIT PRODUCTION FARMS WHEN THERE IS CERTAIN RISK OF EPIZOOTIC ENTEROPATHY?

Ramon J., Perucho O., Rafel O., Sánchez J.P., Piles M.

Programa de Millora Genètica Animal. Subprograma de Cunicultura. Institut de Recerca i Tecnologia Agroalimentaries (IRTA), Torre Marimon, 08140 CALDES DE MONTBUI, Spain.

josep.ramon@irta.cat

This research aimed to clear up the effect of quantitative feed restriction during the fattening period on several traits involved in meat production. A total of 7631 rabbits from 1332 litters were distributed in collective cages assigned equally to 2 types of feeding regime for the whole 5-wk fattening period: full-feeding (i.e. *ad libitum*; AL) or restricted feeding (R). The restriction was in absolute amount of food, being increased with age, and totalling 75% of the *ad libitum* intake over the same age period. Kits from the same litter were equally distributed into both treatments, ensuring a uniform initial kit body weight in the same cage. Kits were individually weighed at weaning and weekly. Feed intake of kits in the same cage was also recorded weekly. Mortality was recorded daily. The analysed traits were: i) weekly body weight, coefficient of variation of body weight and average daily gain; ii) feed intake and feed conversion ratio; iii) carcass weight and yield; iv) the probability of death and the likelihood of suffering from digestive or respiratory diseases, or a bad general condition and Sanitary Risk Index (SRI). Feed restriction led to lighter animals throughout the entire fattening period and greater variation in its size within cage. However, the acceleration phase of growth of these animals remained longer and its fall was less sharp than in animals fed *ad libitum*. Feed restriction improved feed efficiency by 2.5%, mortality by 32%, the probability of suffering a digestive and respiratory disease by 35 and 47%, respectively, and reduced health risk index by 2.3%. The carcass yield worsened by 1.5 points, although animals were able to reach commercial slaughter weight

for the Spanish market. The production cost was not affected.

MICROBIOLOGICAL CHARACTERISTICS OF WATER IN RABBIT FARMS IN NORTH-EAST PORTUGAL

COELHO A.C.^{*†}, PINHEIRO V.^{†‡}, QUINTEIRO M.^{*}

^{*}Dept. de Ciências Veterinárias, Universidade de Trás-os-Montes e Alto Douro (UTAD), 5001-801 VILA REAL, Portugal.

[†]CECAV, Universidade de Trás-os-Montes e Alto Douro (UTAD), 5001-801 VILA REAL, Portugal. [‡]Dept. de Zootecnia, Universidade de Trás-os-Montes e Alto Douro (UTAD), 5001-801 VILA REAL, Portugal..

vpinheir@utad.pt

This study presents some of the results obtained as part of a master's thesis evaluating the microbiological quality of water watering of farms in north-east Portugal. Water samples were collected from 12 farms in the period from October 2014 to March 2015. On each farm, samples were taken at various locations, from beginning to end of each line (on av. 9 crops per farm) to assess the water characteristics and quality along the route. The results of the farms water samples were negative for the presence of total coliforms, faecal coliforms (*E. coli*) in 11 out of 12 farms and faecal streptococci (*Enterococcus*) in 10 out of 12 farms assessed. The total number of microorganisms at 22°C was less than 100 CFU/mL and at 37°C was less than 10 CFU/mL on these 11 farms. Based on the results of this study, we can see that the microbiological quality of the water consumed by rabbits is good on farms in the region under study.

EFFECT OF THE INCLUSION OF COWPEA STRAW IN GROWING RABBITS' DIETS

ANDRADE E.A.^{*†}, MOURÃO J.L.^{*‡}, RIBEIRO L.[#], FERREIRA L.M.M.^{*‡}, RODRIGUES M.A.M.^{*‡}, CARVALHO R.[§], PINHEIRO V.^{*‡}

^{*}Departamento de Zootecnia, Universidade de Trás os Montes e Alto Douro, 5000-801 VILA REAL, Portugal. [†]Fundação CAPES, Ministério da Educação do Brasil, BRASÍLIA-DF 70040-020, Brasil. [‡]CECAV, Universidade de Trás os Montes e Alto Douro, 5000-801 VILA REAL, Portugal. [#]Estirpe d'honra-Cunicultura industrial, BRAGANÇA, Portugal. [§]Nanta Portugal, 4634-909 MARCO DE CANAVESES, Portugal.

vpinheir@utad.pt

This study evaluated the effect of inclusion of cowpea straw in the diet of growing rabbits. A total of 180 animals were randomly assigned to 3 treatments. Treatments included the basal medicated diet with the inclusion of 0% (FF0), 2% (FF2) and 4% (FF4) of straw. Animal performance was evaluated at 53rd and 67th d of age. The final body weight (67 d), conversion rate and feed digestibility were not affected by the incorporation of straw ($P>0.05$).

Food intake was higher in the diet with greater inclusion of cowpea straw (FF4) compared to other treatments ($P=0.041$). Increasing cowpea straw in the diet to 40 g/kg (FF4) had no effect on weight gain of animals compared to control treatment. However, higher weight gains were observed ($P=0.047$) when compared to the diet with 20 g/kg (FF2). This study demonstrated that incorporation of 2 and 4% levels of straw did not affect the growth performance of rabbits. Future studies should address the possibility of incorporating higher levels of cowpea straw.

EFFECT OF LEVEL OF SOLUBLE FIBRE AND OMEGA-6/OMEGA-3 RATIO ON WATER INTAKE IN GROWING RABBITS

DELGADO R., ABAD-GUAMÁN R., NICODEMUS N., SASTRE J., MENOYO D., CARABAÑO R., GARCÍA J.

Departamento de Producción Agraria, ETSI Agrónomos, Universidad Politécnica de Madrid. MADRID, Spain.

javier.garcia@upm.es

The aim of this work was to study the effect of dietary soluble fibre and the n-6/n-3 ratio on growing rabbit water intake. To this end, a factorial design was used with 2 soluble fibre levels (7.8 vs. 14.4%) and two n-6/n-3 ratios (13.4 vs. 3.5). Forty rabbits weaned at 26 d of age (weighing 449±58 g) were used (10/diet). Epizootic rabbit enteropathy affected 42% of the rabbits and sick rabbits were only controlled up to 39 d of age. From 26 to 39 d of age, the increase in soluble fibre tended to reduce feed intake and increase water intake ($P=0.065$ and 0.055) in healthy rabbits, leading to a water/feed intake ratio 46% higher with high soluble fibre content. No differences were observed between 30 and 62 d of age. However, in diseased rabbits there was no difference in water or feed intake. There were no differences between healthy and sick animals in water intake, while feed intake decreased by 35% in sick rabbits (70 vs. 45 g/d. $P<0.001$), resulting in an increasing water/feed intake ratio trend (1.68 vs. 2.41; $P=0.087$). The ratio n-6/n-3 had no effect on these traits.

EFFECT OF B-GLUCANS AND CHITO-OLIGOSACCHARIDES ON GROWTH PERFORMANCE OF GROWING RABBITS

GUENAOUI M.^{*}, ABAD-GUAMÁN R.^{*}, OCASIO-VEGA C.^{*}, ACOSTA N.[†], HERAS M.A.[†], MENOYO D.^{*}, CARABAÑO R.^{*}, GARCÍA J.^{*}

^{*}Departamento de Producción Agraria, ETSI Agrónomos, Universidad Politécnica de Madrid. MADRID, Spain. [†]Instituto de Estudios Biofuncionales (UCM). MADRID, Spain.

javier.garcia@upm.es

The aim of this work was to study the effect of yeast β -glucans and chito-oligosaccharides supplementation on growth performance of growing rabbits. A control diet was formulated with 18.1% protein, 33.1% neutral detergent fibre and 13% soluble fibre (on dry matter basis). Another 4 diets were obtained by supplementing control diet with β -glucans (200 or 400 ppm) and chito-oligosaccharides (200 or 400 ppm). Forty-two rabbits per treatment weaned at 28 d of age (510 ± 73.0 g) were used to record growth traits and 56/treatment to record mortality. Experimental diets were offered from weaning up to 38 d of age. At this point, all rabbits were fed the control diet up to 63 d of age. No antibiotic was used. Diet supplementation with β -glucans and chito-oligosaccharides did not affect growth traits throughout the fattening period (46.8 g/d, 113 g/d, and 0,417 on av. for growth rate, feed intake and feed efficiency for the whole fattening period). However, mortality increased in rabbits supplemented with 200 ppm β -glucans compared to the higher dose (42.9 vs. 25%, respectively. $P=0.048$). In conclusion, in our conditions the supplementation with β -glucans and chito-oligosaccharides, independently of the dose, did not improve the growth performance compared to a high soluble fibre based diet.

EVOLUTION OF THE PRESENCE OF FAECES IN THE NEST DURING LACTATION IN MULTIPAROUS RABBIT DOES

NICODEMUS N., ABAD-GUAMÁN R., DELGADO R., OCASIO-VEGA C., GUENAOUI M., MENOYO D., CARABAÑO R., GARCÍA J.

Departamento de Producción Agraria, ETSI Agrónomos, Universidad Politécnica de Madrid. MADRID, Spain.

javier.garcia@upm.es

The aim of this work was to study the evolution of the presence of faeces in the nest in the 17 first days of lactation. To this end, 40 multiparous rabbit does selected just after kindling were used. On the 2nd d of lactation, 20 does were selected at random and 8 hard faecal pellets were put in the nest. The nests were checked, counting the number of faecal pellets (and returning them to the nest) and the presence of soft faeces and bitten faeces at days 3, 6, 10, 13 and 17 post-partum. Litters were weaned at 27 d of age and mortality during fattening was recorded in 5 rabbits/litter. Rabbits were not treated with antibiotics. The addition of hard faeces to the nest differentiated both groups of nests by 13.7 faeces on average, which was maintained for the whole experimental period ($P=0.002$). The amount of hard faeces in the nest increased linearly from 3 to 10 d post-partum and then decreased up to 17 d post-partum ($P<0.001$). Bitten hard faeces appeared in the nest at day 10 post-partum and the maximum proportion of nests containing bitten faeces

was recorded at 13 d post-partum ($P<0.001$). From that moment onwards, this proportion decreased. Throughout the experimental period, bitten faeces appeared in 95% of the nests. In contrast, the observation of soft faeces was rather occasional and they were found only in 55% of the nests, with no effect of treatment or day post-partum. No relationship was established between the amount/presence of hard faeces in the nest and mortality during fattening period, which was 20% on average.

PRODUCTION AND PRODUCTS

SUSTAINABILITY INDEXES OF RABBIT FARMS, INCLUDING THE FREQUENCY OF ANTIBIOTIC TREATMENTS (IFTA)

RAFEL O.^{*}, DALMAU A.[†], PILES M.^{*}, PASCUAL M.[‡], GÓMEZ EA.[‡], RAMON J.^{*}

^{*}IRTA. Unidad de Cunicultura. Torre Marimón. 08140 CALDES DE MONTBUJ, Spain. [†]IRTA. Subprograma de Bienestar Animal. Veinat se Sies S/N. 17121 MONELLS, Spain. [‡]CITA - Instituto Valenciano de Investigaciones Agrarias. Apartado 187. 12400 SEGORBE, Spain.

oriol.rafel@irta.cat

The SAT CC is developing the project on "Sustainability in rabbit farms by implementing a management tool based on the bdcuni platform" with the aim at improving the income of rabbit farms. In this work we present a definition of sustainability, the pillars on which it is based and new indexes involved in its measurement. The economic pillar of sustainability is related to profitability and technology level is one of the factors involved. An index to measure it is proposed. The social pillar is related to the farmers' life quality. Several new indexes provide feedback on the quality and quantity of their work. The environmental pillar is approached from two perspectives: animal welfare and the rational use of drugs (basically antibiotics). Animal welfare is measured from current production rates as well as from new rates regarding the use of footrests or animal density in the cages. The rational use of drugs is measured using the IFTA index, which indicates the frequency of treatments with antibiotics.

SLAUGHTER TRAITS COMPARISON IN CROSSBRED RABBITS RESULTING FROM FOUR MATERNAL LINES

MINGUEZ C.

Carrera de Medicina Veterinaria y Zootecnia, Universidad Politécnica Salesiana, Calle Vieja 12-30 y Elia Luit, CUENCA, Ecuador.

cminguez@ups.edu.ec

Slaughter traits including live weight (LW, g), commercial skin weight (CSKW, g), full gastrointestinal weight (FGTW, g), hot carcass weight (HCW, g) and dressing percentage (CDP, %) of 1360 crossbred rabbits resulting from four maternal lines (A, V, H and LP) were evaluated in this study. The does were sorted into 7 genetic groups: 6 simple crosses (A×V, A×H, A×LP, V×H, V×LP and H×LP) and females from line V, used as a control population. The rabbits were raised on 2 commercial farms with the same management system. The animals were weaned at 28 d and then housed in collective cages of 8 rabbits until slaughter at day 63. The genetic group effect was not significant for the traits studied. The fact that there were no significant differences in live weight is considered a positive result, as any of the crossbred females can be used in commercial farms with similar productive results.

DEVELOPMENT OF A SAUSAGE FROM RABBIT MEAT

CASILLAS-PENUELAS R.^{*,†*}, PÉREZ-ESTEVE E.^{*}, FUENTES A.^{*}, GRAU-MELO R.^{*}, PASCUAL J.J.[‡], BARAT-BAVIERA J.^{*}

^{*}Departamento de Tecnología de Alimentos, Universitat Politècnica de València, Camino de Vera s/n, 46022 VALENCIA, Spain. [†]Departamento de Tecnología de Alimentos, Universidad Autónoma de Aguascalientes, Av. Universidad s/n, 20230 AGUASCALIENTES, México, Spain. [‡]Instituto de Ciencia y Tecnología Animal, Universitat Politècnica de València, Camino de Vera s/n, 46022 VALENCIA, Spain.

racasi@correo.uaa.mx

Rabbit meat consumption is very low despite its excellent nutritional profile. One possible strategy to increase its consumption, especially in children, involves the production of processed products such as sausages. The aim of this work was the development of a Frankfurter type sausage using rabbit meat as raw material. Its nutritional profile and physicochemical parameters were compared with commercial sausages made from pork, turkey and chicken. The results showed that rabbit meat sausages presented an improved nutritional profile (low fat and high protein contents) and very similar physicochemical parameters (pH, colour and texture) to those of turkey and chicken sausages. These results highlight the value of rabbit meat in the manufacture of processed meat products.

THE USE OF VIDEO AND THERMAL IMAGES TO PREDICT LIVE WEIGHT IN RABBITS

SILVA, S.R.^{*,†}, MOURÃO J.L.^{*,†}, GUEDES C.^{*,†}, MONTEIRO D.^{*}, PINHEIRO V.^{*,†}

^{*}Departamento de Zootecnia, Universidade de Trás os Montes e Alto Douro, 5000–801 VILA REAL, Portugal. [†]CECAV, Universidade de Trás os Montes e Alto Douro, 5000–801 VILA REAL, Portugal.

vpinheir@utad.pt

The aim of this study was to evaluate the use of video images and/or thermal imaging to estimate the live weight of rabbits at different stages of growth. This technology has been used in beef and pork and less in other species like rabbits. A total of 72 rabbits were used with 1.75 ± 0.48 kg to capture video images and thermographic images and try to establish the relationship between live weight and measurements in the thermal and video images. The results show a high correlation between measurements in both techniques and body weight (r between 0.54 to 0.80, $P < 0.01$) and was able to explain 64% ($P < 0.01$) of the live weight variation. The parameters assessed showed no differences between the 2 techniques.

GROWTH TRAITS AND DRESSING PERCENTAGE IN RABBITS FROM A THREE-WAY CROSSBREEDING SCHEME

MINGUEZ, C.

Carrera de Medicina Veterinaria y Zootecnia, Universidad Politécnica Salesiana, Calle Vieja 12-30 y Elia Luit, CUENCA, Ecuador.

cminguez@ups.edu.ec

This study evaluated the weaning weight (WW, g.), slaughter weight (LW, g.), conversion ratio (FCR) and dressing percentage (CDP, %) of rabbits whose does came from the cross between the 4 maternal lines of the Polytechnic University of Valencia. Thus, 6 simple crosses (A×V, A×H, A×LP, V×H, V×LP and H×LP) were formed and the V line was used as control population. The management was: weaning at 28 days and slaughtering at 63 d. For CDP the genetic groups that included the A line were shown to be the heaviest. The genetic group effect was not significant for the other traits. This is considered a positive result, as any of the crossbred females can be used in commercial farms with similar productive results.

REPRODUCTION

STUDY OF THE INFLUENCE OF AGE ON SEMINAL PARAMETERS IN VALENCIAN RABBIT BREED (LINE R)

DOMINGUES V.^{*}, GÓMEZ-COUSO H.[†], ARIAS LÓPEZ J.M.^{*,‡}, DE SANTA RITA VAZ E.[#]

^{*}Centro de Inseminación Artificial Zapiños, Franco, 11 A, Montouto, 15318 ABEGONDO, A Coruña, Spain. [†]Departamento de Microbiología y Parasitología, Facultad de Farmacia, Campus Vida, 15782 SANTIAGO DE COMPOSTELA, A Coruña, Spain. [‡]Centro de Selección e Inseminación Artificial El Adil Redondo, Calle La Beltrana, nº 25, 24270 CARRIZO DE LA RIBERA, León,

Spain. ⁴UTC Ciências da Vida e dos Alimentos, Escola Superior Agrária, Instituto Politécnico de Castelo Branco, Qt.ª da Sr.ª de Mércules, 6001-909 CASTELO BRANCO, Portugal.

vania@eladilredondo.com

The aim of this study was to investigate the influence of age on semen parameters of appearance, volume, motility and seminal concentration in rabbit bucks sperm with meat aptitude of Valencian strain (Line R). In the period from January 2, 2007 to October 31, 2013, a total of 188128 ejaculates of 1972 male rabbits aged between 4 and 38 mo were analysed. After extraction the ejaculates were evaluated macroscopically, determining their appearance and, in the case of ejaculates of normal appearance, the volume. The ejaculates were then diluted in 1:5 ratio and examined under phase contrast microscopy at 200 \times , quantifying the sperm concentration, motility and related parameters (agglutinations, abnormal forms, dead spermatozooids, water presence and dirtiness in ejaculates). It was shown that the group of animals of 11-17 mo of age presented the highest values for average ejaculate volume, sperm concentration, percentage of ejaculates with sperm motility >80% and low percentage of ejaculates with dead spermatozooids. In contrast, the worst results in appearance, sperm motility, dirtiness and final aptitude of the ejaculates were observed in animals 4-10 mo old.

EFFECT OF LITTER SIZE AND POLYUNSATURATED FATTY ACID N-3 SUPPLEMENTATION IN LACTATING RABBIT DOES

FEBREL N.^{*}, RODRÍGUEZ M.^{*}, VELASCO B.^{*}, LÓPEZ-TELLO J.[†], GARCÍA-GARCÍA R.M.[‡], ARIAS-ÁLVAREZ M.[‡], LORENZO P.L.[‡], REBOLLAR P.G.^{*}

^{*}Departamento de Producción Agraria, E.T.S.I. Agrónomos, UPM, Cdad. Universitaria s/n 28040, MADRID, Spain.

[†]Departamento de Producción Animal, Fac. Veterinaria. UCM, Cdad. Universitaria s/n 28040, MADRID, Spain. [‡]Departamento de Fisiología (Fisiología Animal). Fac. Veterinaria. UCM, Cdad. Universitaria s/n 28040, MADRID, Spain.

pilar.grebollar@upm.es

In this work, 2 isofibrous, isoenergetic and isoproteic diets with a different source of fat were formulated. In PUFA (Polyunsaturated Fatty Acids) diet, 6% PUFA n-3 supplement with 50% ether extract from refined oil salmon and in C diet, a 3% of lard was included. In a total of 48 rabbit does fed the diets from the rearing period, a litter size adjustment was made after their first parturition: high [10-12 kits; C_A (n=11) and PUFA_A (n=12)] or low [(7-9 kits; C_B (n=12) and PUFA_B (n=13)] and were artificially inseminated at weaning. Milk fatty acid composition was analysed on day 11 of lactation (5 C and 5 PUFA). At 2nd parturition, fertility, number born alive and their live

body weight were similar in all groups. Milk fatty acid composition was similar to the respective diets, resulting in a more unsaturated profile on PUFA milk than in Control ones. A litter size of 7-9 young in first lactation increased mortality at the 2nd parturition in control rabbits, whereas in PUFA does it tended to be lower. Although the number of weaned rabbits was similar, those from rabbit does fed PUFA diet had low body weight at weaning. In conclusion, fatty acids composition from diets was transferred to milk fatty acid composition, being more unsaturated in PUFA does. Productive parameters, as viability at 2nd parturition, were improved in supplemented does, although the live body weight of young rabbits at weaning was lower.

DIETS SUPPLEMENTED WITH POLYUNSATURATED FATTY ACIDS N-3 IMPROVE FOETAL-PLACENTAL DEVELOPMENT OF RABBIT DOES

RODRÍGUEZ M.^{*}, LÓPEZ-TELLO J.[†], FORMOSO-RAFFERTY N.[‡], GARCÍA-GARCÍA R.M.[‡], ARIAS-ÁLVAREZ M.[‡], LORENZO P.L.[‡], REBOLLAR P.G.^{*}

^{*}Dept. Producción Agraria, E.T.S.I. Agrónomos, UPM, Ciudad Universitaria s/n, 28040 MADRID, Spain. [†]Dept. Producción Animal, Fac. de Veterinaria, UCM, Ciudad Universitaria s/n, 28040 MADRID, Spain. [‡]Dept. Fisiología (Fisiología Animal), Fac. de Veterinaria, UCM, Ciudad Universitaria s/n, 28040 MADRID, Spain.

pilar.grebollar@upm.es

A total of 74 nulliparous 8 wk old were randomly distributed in 2 groups until the first parturition. They were fed isofibrous, isoenergetic and isoproteic diets, each supplemented with a different fat source: lard for control diet (Control group; n=37) and a salmon oil supplement rich in polyunsaturated fatty acids n-3 (AGPI group; n=37) at an inclusion level of 6% (30 g/kg). In rearing, rabbits received 130 g/d, and 10 d before insemination they were fed *ad libitum*. Throughout the first 3 wk of gestation they were feed-restricted again, and *ad libitum* fed during the last week. From each group, 5 animals were euthanised on day 28 of gestation to determine the foetal-placental development. For the remaining does, pregnancy was continued to term to determine productive parameters of fertility and prolificacy. During the *ad libitum* feeding period, feed intake of supplemented rabbits was lower than in control ones. Even though there were no significant differences in the number of corpora lutea and foetuses on day 28 of gestation, the thickness of foetal placenta (labyrinth) and foetuses of supplemented rabbits was significantly greater than in the control group. This could be explained by the positive correlation found between both parameters, which had not been observed with the maternal part (decidua) of the placenta. Furthermore, dietary supplementation with n-3 PUFA also improved the numbers of liveborn and stillborn rabbits. In conclusion,

although the inclusion of n-3 PUFA decreases the feed intake, it has been shown to enhance foetal-placental development and productive parameters in rabbit does.

ARE THERE EARLY DIFFERENCES BETWEEN RABBIT FEMALES THAT REACH THE FIFTH REPRODUCTIVE CYCLE AND THOSE THAT DO NOT?

PENADÉS M.^{*}, ARNAU-BONACHERA A.[†], GARCÍA-QUIRÓS A.^{*}, MARTÍNEZ-PAREDES E.[†], RÓDENAS L.[†], SELVA L.^{*}, VIANA D.^{*}, CERVERA C.[†], PASCUAL J.J.[†], CORPA J.M.^{*}

^{*}Instituto de Ciencias Biomédicas y Dept. Producción y Sanidad Animal, Salud Pública Veterinaria y Ciencia y Tecnología de los Alimentos, Facultad de Veterinaria, Universidad CEU Cardenal Herrera, Tirant lo Blanc, 7, 46115 ALFARA DEL PATRIARCA, Valencia, Spain. [†]Instituto de Ciencia y Tecnología Animal, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022 VALENCIA, Spain.

alarbo@upv.es

A high replacement rate of young rabbit females can influence the economic profitability of farms, and could be the origin or sign of a low sanitary status on the farm. The aim of this study was to determine whether there are differences between females that survive to the fifth reproductive cycle and those that fail to do so, for a broad set of variables. Management, nutrition and genetics also influence these variables, which in turn affect different vital functions. To perform this study, 38 variables related to lymphocyte populations, energy blood metabolites and productive resources were measured in 88 rabbits during the first reproductive cycle, recording whether these rabbits reached the fifth reproductive cycle or not. The results show that there are differences at the onset of reproductive life among females that survived until the fifth reproductive cycle and those that did not. These differences seem to be more relevant for variables related to blood metabolites, although there were inter-correlations between all the studied variables that would require further studies. Characteristics of survivor-classified females seem to be necessary, but not sufficient to ensure survival of females.

INFLUENCE OF PHYTOGENIC EXTRACTS ON REPRODUCTIVE PERFORMANCE AND PHYSIOLOGICAL PARAMETERS OF DOE RABBITS

ABD-EL-HADY A.M.^{*}, EL-GHALID O.A.H.^{*}, RAGAB M.[†]

^{*}Poultry Prod. Depart., Faculty of Agriculture, Alexandria University, Egypt. [†]Poultry Prod. Depart., Faculty of Agriculture, Kafr El-Sheikh University, Egypt.

mohamed.mohamed@irta.cat

The objective of this study was to assess the effect of phytogetic extracts as feed additives on the reproductive performance and some physiological parameters of a

maternal rabbit line (M). A total of 30 females, at 5 mo of age, were divided randomly into 3 equal groups (10 females/group). The first group (G0) was fed on a commercial diet (control), while the other 2 groups were fed on the same diet but supplemented with 300g/ton (G1) or 400g/ton (G2) of phytogetic extracts. The experimental period was extended for 3 parturitions. G1 and G2 showed higher values of kindling rate, litter size and litter weight at birth and at weaning. Moreover, milk yield increased significantly and consequently the pre-weaning mortality decreased. In the serum, total proteins and globulin concentration at the 3rd d after kindling were significantly higher as the phytogetic extract dosage increased. Glucose, thyroxin (T4), prolactin and insulin-like growth factors-I (IGF-I) concentrations were increased significantly in both G1 and G2 groups, while the total cholesterol and triglycerides were decreased. It may be concluded that the use of phytogetic extracts as feed additives in doe rabbit rations with 400g/ton can improve reproductive traits without any adverse effect on the doe's physiological status.

INTRAUTERINE POSITION AFFECTS CORRECT FOETAL-PLACENTAL DEVELOPMENT IN THE RABBIT

LÓPEZ-TELLO J.^{*}, RODRÍGUEZ M.[†], FORMOSO-RAFFERTY N.^{*}, BERMEJO R.^{*}, ARIAS-ÁLVAREZ M.^{*}, GARCÍA-GARCÍA M.[†], LORENZO P.L.[‡], REBOLLAR P.G.[†]

^{*}Dept. Producción Animal, Facultad Veterinaria, Universidad Complutense de Madrid, Av. Puerta de Hierro, S/N, 28040 MADRID, Spain. [†]Dept. Producción Agraria, Escuela Técnica Superior Ingenieros Agrónomos, Universidad Politécnica de Madrid, Av. Puerta de Hierro, S/N, 28040 MADRID, Spain. [‡]Dept. Fisiología (Fisiología Animal), Facultad Veterinaria, Universidad Complutense de Madrid, Av. Puerta de Hierro, S/N, 28040 MADRID, Spain.

pilar.greballar@upm.es

To study within-litter variation, 129 foetuses and their placentas were characterised regarding their position in uterus. Conceptus adjacent to the ovary had greater placental weight and therefore better morphometric parameters compared to its siblings. Regarding foetal organs, the brain, liver and digestive tract were significantly heavier in those developed next to the ovary. A positive correlation was obtained between placental and organ weights. These findings may be related to a higher placental development and therefore a higher nutrient availability.

ETHOLOGY

MATERNAL BEHAVIOUR OF RABBIT DOE WITH RESTRICTED NEST ACCESS

CERVERA C.*, CRESPO S.I., MARTÍNEZ-PAREDES E.

Instituto de Ciencia y Tecnología Animal, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022 Valencia, Spain.

ccervera@dca.upv.es

The effects of nest access restriction on milk production and nest behaviour of 48 multiparous rabbit does was measured during the first 3 wk of controlled lactation. Litter growth and viability and the productivity of rabbit does were not affected by the dam's access to the nest, but the frequency of approximation to the nest by the rabbit does showed a reduction when the nest was permanently closed ($P<0.001$), especially in the 1st wk of lactation and after nursing.

ASSESSMENT OF CAGE PLATFORM USE IN RABBIT DOES AND KITS DURING LACTATION

SAHUQUILLO J.*, MARTÍNEZ-PAREDES E.*, VILLAGRÁ A.†, CERVERA C.*

* Departamento de Ciencia Animal, Universidad Politécnica de Valencia, Camino de Vera s/n, 46022 VALENCIA, Spain. †Centro de Tecnología Animal, Instituto Valenciano de Investigaciones Agrarias CITA-IVIA, Polígono La Esperanza 100, 12400 SEGORBE, Castellón, Spain.

villagra_ara@gva.es

The presence and functionality of raised platforms in cages for rabbit does is being discussed in depth in the European Union nowadays. This work assesses the use of the platform by the rabbit doe and the litter, both in time and frequency. Results show that dams use it mainly to get away from the litter and also that once the young rabbits can reach the platform, they use it even more than the doe.

PATHOLOGY

IMPORTANCE OF ROTAVIRUS TYPE A IN ENTERIC PROCESS IN FATTENING RABBIT: COMPARATIVE STUDY BETWEEN ANIMALS WITH ENTERIC PROCESSES AND HEALTHY ANIMALS

DOMINGO P., FERNÁNDEZ A., SANZ C., PUEYO R., BOROBIA M., MUÑOZ A., BENITO A., CHACÓN G.

Exopol S.L. Pol. Río Gállego D-8. 50840 SAN MATEO DE GÁLLEGO, Zaragoza, Spain.

gchacon@exopol.com

Enteric diseases produce serious economic losses in cuniculture due to mortality, decreased growth and worsening conversion rate. The aim of this study was to assess the importance of rotavirus in the differential diagnoses of diarrhoea in fattening rabbits and the relation

with other etiological agents. Therefore, digestive tract samples of 90 cases with gastrointestinal symptoms and 40 cases without gastrointestinal symptoms in fattening rabbits between 35 and 55 d of age were analysed. Samples were microbiologically cultured and PCR real time assay (qPCR) was used for detection of rotavirus and *Escherichia coli eae* gene. *Eimeria* spp. was detected by coprology study and the presence of *Clostridium spiroforme* and *Clostridium perfringens* was assessed by Gram stain. Rotavirus was detected in 57.8% of cases of sick animals, but just 25% of healthy animals were positive ($P<0.01$). The presence of a single agent did not exceed 2.2%, demonstrating the multifactorial nature of enteric processes. The presence of rotavirus in sick animals increases the presence of other agents: coccidia and enteropathogenic *E. coli*, $P<0.05$. To conclude, rotavirus type A is involved in enteric processes in fattening rabbits and should be included in the differential diagnosis.

MOLECULAR CHARACTERISATION OF PASTEURELLA MULTOCIDA ISOLATES ASSOCIATED WITH THE MAIN CLINICAL PRESENTATIONS OF PASTEURELLOSIS IN RABBIT FARMS IN THE IBERIAN PENINSULA

GARCÍA-ALVAREZ A.*, FERNÁNDEZ A.†, SANZ C.‡, BOROBIA M.†, CHAVES F.‡, CID D.‡

*Departamento de Sanidad Animal, Facultad de Veterinaria, Universidad Complutense Madrid, Avenida Puerta de Hierro s/n, 28040 MADRID, Spain. †Exopol, Pol. Río Gállego D8, 50840 SAN MATEO DE GÁLLEGO, Zaragoza, Spain. ‡Red Española de Investigación en Patología Infecciosa. Departamento de Microbiología Clínica, Hospital Universitario 12 de Octubre, Avenida de Córdoba s/n, 28041 MADRID, Spain.

lcid@ucm.es

Although pasteurellosis is the predominant bacterial disease on rabbit commercial farms, *P. multocida* isolates from rabbits have been poorly characterised. The aim of this study was to molecularly characterise a collection of *P. multocida* isolates obtained from cases of disease in rabbit commercial farms located across the Iberian Peninsula. One hundred and one *P. multocida* isolates were randomly selected and characterised by PCR capsular typing and PCR detection of four virulence genes, *toxA*, *tbpA*, *hgbB* and *pfnA*. Of the 101 isolates studied, 48 (47.5%) were capsular type A, 28 (27.7%) type D, and 25 (24.8%) type F. In total, 63 of the 101 isolates (62.38%) were positive for *hgbB* gene, 43 (42.57%) for *pfnA* gene, and only one isolate was positive for *tbpA*. All except one of the capsular type D isolates (27/28) belonged to the same virulence profile (*toxA*–, *tbpA*–, *hgbB*+ and *pfnA*–). This subpopulation was significantly associated with respiratory clinical presentation of the disease (OR 5.68, IC95% 1.69-25.59) and widely distributed across the

Iberian Peninsula. In conclusion, pasteurellosis in rabbits can be caused by a heterogeneous group of *P. multocida* isolates. However, a subpopulation of *P. multocida* capsular type D seems to be strongly associated with respiratory clinical manifestation of the disease in rabbits. These findings are important in the development of vaccines for pasteurellosis prevention in rabbit farms, especially respiratory disease.

EVALUATION OF *STAPHYLOCOCCUS AUREUS* EXOPOLYSACCHARIDES BASED AUTOGENOUS VACCINES IN COMMERCIAL RABBIT FARMS

FERNÁNDEZ A., MUÑOZ A., BOROBIA M., CHACÓN G., SANZ C., ALBIZU M., BASELGA R.

EXOPOL Autovacunas y Diagnóstico. Pol. Río Gállego, 50840, SAN MATEO DE GÁLLEGO, Zaragoza, Spain.

afernandez@exopol.com

Staphylococcosis is one of the most significant bacterial diseases in rabbit farms, causing high mortality in young rabbits and pyogenic processes in does and growing rabbits. In this study, different autogenous vaccines were tested on 3 affected farms. In each farm, 2 different autogenous vaccines made with the same strain were tested: an improved vaccine which had previously shown effectiveness in an experimental infection model and another vaccine which was a variant of the first. All breeding does included in an artificial insemination cycle were vaccinated or left as controls, whose members were inoculated with the adjuvant only. Two doses were administered before delivery with the exception of nulliparous does in farm 3, which were inoculated with 3 doses. Production data were collected from insemination until weaning. A significant decrease in mortality in lactating period in the group vaccinated with the improved autogenous vaccine was observed on all farms. In farm 3, fewer reproductive females were eliminated in vaccinated groups than in the control group ($P=0.0075$). These results confirm the effectiveness of *Staphylococcus aureus* exopolysaccharides based autogenous vaccines in naturally affected commercial rabbit farms.

WHAT IMMUNOLOGICAL WEAPONS DO RABBITS HAVE AGAINST STAPHYLOCOCCAL INFECTIONS?

MUÑOZ-SILVESTRE A., PENADÉS M., GARCÍA-QUIRÓS A., SELVA L., VIANA D., CORPA J.M.

Instituto de Ciencias Biomédicas. Dept. Producción y Sanidad Animal, Salud Pública Veterinaria y Ciencia y Tecnología de los Alimentos. Facultad de Veterinaria. Universidad CEU Cardenal Herrera. Tirant lo Blanc, 7. 46115 ALFARA DEL PATRIARCA, Valencia, Spain.

asuncion.munoz@uch.ceu.es

Staphylococcus aureus is a bacterium whose characteristics allow it to infect humans and animals. This bacterium produces different types of lesions in rabbits of all ages. An experimental infection was designed in order to characterise the immune response after intradermal inoculation of a "high virulence" strain (ST121). All the inoculated animals developed lesions. A peak at 24-48 h post infection in cytokine levels was detected, coinciding with the development of lesions and migration of immune cells to the infection site.

HOW DOES *STAPHYLOCOCCUS AUREUS* ADAPT TO RABBITS?

PENADÉS M., COMOS M., SELVA L., MUÑOZ-SILVESTRE A., GARCÍA-QUIRÓS A., CORPA J.M., PENADÉS J.R.†, VIANA D.*

*Instituto de Ciencias Biomédicas. Dept. Producción y Sanidad Animal, Salud Pública Veterinaria y Ciencia y Tecnología de los Alimentos. Facultad de Veterinaria. Universidad CEU Cardenal Herrera. Tirant lo Blanc, 7. 46115 ALFARA DEL PATRIARCA, Valencia, Spain. †Institute of Infection, Immunity and Inflammation, College of Medical, Veterinary and Life Sciences, University of Glasgow, 120 University Place, GLASGOW, UK.

mariola.penades@uch.ceu.es

Staphylococcus aureus is an opportunistic bacterium responsible for high rates of culling and significant economic losses in rabbit farms. Although this bacterium has not always been a threat to this species, its pathogenicity in the rabbit has developed in recent decades. To investigate the molecular basis of a bacterium-host relationship, this study traces the evolutionary trajectory of the most common rabbit clone of *S. aureus* affecting rabbits. It was possible to demonstrate that the host jump from human to rabbit occurred over 40 yr ago, due to a single nucleotide mutation, which was sufficient and essential to convert a human-specific strain of *S. aureus* into one able to infect rabbits. In addition, we have identified related mutations located in the same gene in other rabbit bacterial lineages, supporting the existence of a process of convergent evolution. This is the first description of a single mutation that is sufficient to alter the host tropism of a microorganism during its evolution, which emphasises the capacity of some pathogens to greatly expand their host populations in new animal species.

EFFECT OF NATURAL ADDITIVES ON PERFORMANCE AND FAECAL OOCYSTS COUNTS OF COCCIDIA INFECTED ANIMALS

SAIZ A., MARTIN E., ALFONSO C., GARCÍA-RUIZ A.I., COMENGE J.†, DEL CACHO E.#, MARCO M.‡

†Poultry and Rabbit Research Centre, Nutreco, 45950 CASARRUBIOS DEL MONTE, Toledo, Spain. #Fábrica de Casetas,

NANTA, 50620 Casetas, Zaragoza, Spain. † NANTA S.A. Ronda de Poniente 9, 28760 Tres Cantos, Madrid, Spain. #Departamento de Patología Animal, Facultad de Veterinaria, Universidad de Zaragoza, 50013 Zaragoza, Spain.

a.saiz.b@nutreco.com

The aim of this study was determine the effect of the inclusion in feed of 2 natural additives (A and B) on the oocyst count, mortality and performance parameters. One hundred and eighty rabbits weaned at 28 d were allocated to individual cages. Animals were assigned to one of the 6 treatments, blocking by litter. Treatments were: T1 and T2, where animals were fed control diets with no additive or anticoccidial product added; T3, where animals were fed a diet D which contained 0.5% of diclazuril; T4, where animals were fed a diet with 300 ppm of additive A; T5, where animals were fed a diet B with 200 ppm of additive B; and T6, where animals were fed a diet DA containing 0.5% of diclazuril and 300 ppm of additive A. Animals of treatments 2 to 6 were challenged with an inoculum of coccidian, while T1 animals were not challenged. Infected animals showed the highest levels of mortality, lowest body weight and a higher level of oocysts in faeces. Animals fed natural additives showed no improvement in performance, mortality or oocyst count. It was concluded than the use of natural additives to replace anticoccidial products is not effective to reduce the coccidian infection or its effect on rabbit performance and mortality.

DIAGNOSIS OF DIGESTIVE DISEASES IN FATTENING RABBITS: PRELIMINARY RESULTS

PÉREZ C.^{*}, PÉREZ A.^{*}, COSCELLI G.[†], AZEVEDO A.M.[†], PANADERO R.^{*}, PRIETO A.^{*}, DÍAZ J.M.^{*}, GULLÓN J.[‡], PRIETO C.[‡], GARCÍA N.[‡], SÁNCHEZ DEL CUETO M.[‡], GARCÍA C.[‡], QUIROGA M.I.[†], FERNÁNDEZ G.^{*}, Díez-Baños P.^{*}

^{*}Dept. Patología Animal, Universidad de Santiago de Compostela, Facultad de Veterinaria, Carballo Calero s/n. 27002 LUGO, Spain. [†]Dept. Ciencias Clínicas Veterinarias. Universidad de Santiago de Compostela, Carballo Calero s/n. 27002 LUGO, Spain. [‡]C.O.G.A.L. Álceme s/n, 36530 RODEIRO, Pontevedra, Spain.

carmeruza@gmail.com

Preliminary results of a broader study focused on the aetiology of diarrhoeal processes in rabbits during weaning period are presented. Microbiological, parasitological and histopathological analyses were performed on intestine and liver samples from rabbits with diarrhoeic disorders on different farms in Galicia. The results show that diarrhoeal processes in post-weaning rabbits are a multi-causal disease. Thus, the most frequent aetiology was mixed with *E. coli* infection, mucoid enteropathy and coccidiosis. Differences in the *Eimeria* spp. identified were observed, with *E. media* being the most frequent, a species of medium pathogenicity.