

Abstract of papers presented during the

27th SYMPOSIUM OF THE Asociación Española de Cunicultura

REUS (Spain) 29-31 May 2002

The 27th Symposium of ASESCU (the Spanish branch of the WRSA) took place last 29-31 May in Reus (Spain). During this event the evolution of rabbit production was revised in seven invited papers along the last 25 years. Actual aspects of management, reproduction, nutrition and pathology were revised in 13 contributed papers that are summarised hereafter.

MANAGEMENT

The ergonomomy in a new rabbit cage

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Ergonomics have been implemented in a natural way and out of common sense in every simple object we use. The same applies to the rabbit cages and design and other materials.

Nevertheless the spectacular change taking place in the last year from 300 does per person to those of more than 600, and the shifting to investing more time and care in the does' cages instead of the time taken by cleaning the pits and filling the feeders has prompted changes on the cages' shape and size.

Until the 1998 Expoaviga fair, industrial cages had the nest flooring at approximately half a meter from the floor. This height forced the breeders to bend their spinal column in excess, in a gesture of closing the shoulders which, when done hundreds of times per day, caused back injury and pain.

Extrona studies on ergonomic basis and its application to cages lead to the launching of a cage line presented three and a half years ago: slanted opening, double door and bigger, single nests...

This writing is based on the interest shown on the application of ergonomics to the health and well being of breeders. This is an area in which, though so many studies on rabbit well being have been published, almost nothing has been published related to rabbit breeders.

Moreover we can make new improvements in Ergonomics, to avoid the excessive bending of the breeders' back, a gesture he, or she, repeats hundreds of times per day, avoiding the hazard of bone or back problems.

Minimum data about comfort in industrial rabbitries

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All rabbit breeders try to get the maximal productivity and profitability in their business, as well as consumers.

Through all the years of animal domestication, a constant trend is shown: the better the animals are kept and catered for, the more they produce.

Ecologist lobbies are putting pressure on the E.U. legislative bodies arguing that changes in rabbit breeding should be made, specially breeding them on

the ground or in bigger cages in a wrong and anthropomorphic tainted version of rabbit behaviour.

Breeding directly on the ground would be counter-productive, increase death tolls and stress. Bigger cages would mean higher production costs. However it has never been proved that excessive additional space would mean higher rabbit comfort levels, but the contrary can be said.

Rabbit breeders are professionals who perfectly know they have to keep adequate animal comfort levels to reach good productivity levels.

There are 30 million rabbit cages in meat production just in Spain, France and Italy that confirm and endorse this view.

The hobby breeding point of view must be separated from functional meat productions cages.

In this paper we put forward the following points:

- 1.- The WRSA (World Rabbit Science Association) as the body with a deeper rabbit breeding knowledge in collaboration with National Associations and Rabbit Inter-Professional Associations must be the only organisation proposing comfort levels before the E.U. Again idealistic frames of mind, rational facts.
 - 2.- We should put forward scientific evidence to demonstrate that production levels are in line with comfort levels based on the weight of the rabbits. Proposing minimum sizes and measures that, from my point of view, will not greatly differ from the present day situation.
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REPRODUCTION

Effect of re-mating interval and weaning age on reproductive performance of rabbit doe

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This study investigated the influence of two re-mating intervals (4 or 11 d after parturition) associated to different weaning ages (25 or 35 d, respectively) on doe reproductive performance. Seventy-two New Zealand x Californian does were used to determine reproductive traits. Does that failed to mate, to conceive, or lost their pups were immediately given the opportunity to re-mate. Early mating of rabbit does allowed for a shorter parturition interval (39.9 vs 44.4 d, $P=0.0001$) and a higher prolificacy, litter size at 21 d and at weaning (9.07 vs 8.11 kits born alive per litter, $P=0.06$; 8.24 vs 7.51, $P=0.06$ and 8.21 vs 7.42, $P=0.05$, respectively) and tended to reduce the number of kits born dead (0.52 vs 0.94, $P=0.10$). Consequently, numerical productivity increased from 61.6 to 73.4 kits/cage and year ($P=0.003$). Does bred intensively had a lower receptivity to the male at the first mating (54 vs 86.9%, respectively), but 88% of these does accepted mating before 7 d after parturition. Fertility was high, above 80%, in all the matings. Treatments did not affect either body weight and mortality of the does or mortality of kits during lactation, which averaged 4301 g, 14.6% and 11.8%, respectively. Feed efficiency increased from 0.241 to 0.309 g of kits weaned/g feed when re-mating interval was longer but these results can not be compared because of the parallel increase in the age and weight of kits at weaning. This study indicates that, in the conditions of reproductive management used, numerical productivity can be increased through

earlier mating and weaning. However more information is needed about the effect of this system on kit performance after weaning.

NUTRITION

Effect of maternal behavior on rabbit growth during lactation

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An experiment was carried out to study whether milk production control is useful to form homogeneous batches of 21 days old kits. The does were weighed before and after suckling for birth to 21 days, in order to evaluate milk production. Does were put in the next box twice a day, one in the morning and once in the afternoon. The link between milk production and kits growth was weak (correlation coefficient = 0.64). Milk production control did not help to build homogeneous kits batches. Does adapted themselves easily to double suckling. However double suckling had no stimulating effect. The same growth, the same feed conversion ratio and the same mortality were observed with double suckling for the same milk production.

Effect of feeding program before weaning on productive performance of fattening rabbits

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Three groups of fattening rabbits were created in order to study the effect of the early weaning on the

fattening results. A special feed with 18.58% crude protein, 5.57% crude fats and 14.53% crude fiber was distributed to the group weaned at 21 days of age, and to one of the 2 other groups, weaned at 30 days of age. Between 19 and 33 days of age, the animals weaned at 21 days consumed 19.8% more solid feed than the average consumption for all the 3 groups. However, the early-weaned group reached a 32g/animal lower weight at 30 days with respect to the average weight for the 3 groups. With that aspect, the kits with a larger weight were not affected as much as the rest of the group. The observed growth difference tended to decrease partially in the later stages of the fattening phase. From 31 to 75 days of age, the same fattening feed was distributed to the 3 groups. No difference was observed at the ADG, FCR and feed consumption levels. The overall mortality was 4.5%. No effect of the early weaning could be found on the mortality in the fattening phase. The special diet for young kits had no advantages with respect to a standard feed when the kits can still consume milk from the does.

Effect of transient doe-litter separation on digestive, enzymatic and intestinal parameters of kit

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The transient doe-litter separation (48 h) in young nursing rabbits 9 days old is an useful method on stimulating ovarian activity in lactating does. The absence of suckling periods would impair the kits' growth, and induce changes in intestinal structure and specific loss of digestive enzymes. This study was aimed at characterising the impact of a 48 hours interval of fast in 9 days old rabbits and the direct effect on the relative weight of the gastrointestinal

tract, height villous and jejunal lactasa activity. The control group had free access to nursing and the fasted group were kept apart during 48 hours. No kits died in either group during the separation period. The variations on body weight and on the gastrointestinal segments relative weight after 48 hours fasting could be due to absence of milk intake and the lost of stomach content, more than a growth delay ($P < 0.05$). A reduction of 13% in villous height was observed (665 vs 579 μm ; $P < 0.05$) after fast, because the absence of food in the jejunal tract has direct effects on epithelial cell proliferation and results in villous atrophy. As a more apical villous distribution of the lactase activity is described, a lower specific lactase activity 48 hours fasted was expected. However, an increase of the glucose liberated ($P < 0.05$) and a lower protein concentration ($P < 0.05$) per g of jejunum result in an increase of the specific lactase activity ($P < 0.05$). More studies are necessary to determine the effect of these changes on the following lactating young development and growth.

Effect of protein source on digestive trait, intestine morphology and ileal and faecal digestibility in early weaned rabbits

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The aim of this work was to evaluate the effect of the dietary protein source on faecal and ileal protein digestibility, dry matter digestibility, digestive traits and intestine morphology in early-weaned rabbits (weaning 25d). The protein sources used were soybean meal (SOJA48), soybean protein concentrate (SOJA61), sunflower meal (GIR36) and potato protein (PAT77). The four diets were formulated to meet or exceed all the essential nutrient requirements of growing rabbits. Ileal apparent protein digestibility of SOJA61 and GIR36 were 7% higher than SOJA48 and

PAT77 (70.7 vs 66.9%). Ileal protein flow with PAT77 treatment tended to be a 26% higher than the other diets. No significant differences were detected in DM or CP fecal digestibility among treatments (65,4 and 77,4%, as average respectively). No significant differences were observed in the jejunal villous height among the different treatments, being 523 mm as average. Digestive traits were similar among treatments: the average of fundic pH, pyloric pH and the stomach content mixture pH were 1.67, 1.33 and 1.47 respectively, and the average proportion of full digestive weight, full stomach weight and full cecal weight relative to body weight were 23.99, 5.91 and 8.54, respectively.

Nutritive value of some by-products for rabbits

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Nutritive value of carob pulp, mulberry leaves, corn and cob meal, rice straw and fatted rice bran for rabbit was determined by substitution of a basal mix or a raw material, or by direct method, following the European reference methods for digestibility trial, chemical analyses and calculation procedures. Chemical composition of each by-product was analysed and digestible energy and protein contents were determined.

Effect of supplementation with fumaric acid and antibiotics on performance of fattening rabbits

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Seventy-two growing rabbits, divided in eight animal groups, were fed nine similar diets based on barley, alfalfa hay, sugar beet pulp and soya bean meal, and supplemented with different doses of chlortetracycline (200, 400, 800 ppm), bacitracin (50, 100, 200 ppm) and fumaric acid (500, 1000 ppm).

Growth was not modified by the addition of the additives, although fumaric acid induced higher feed conversion ratio compared to both antibiotics. The different doses of supplemented substances did not affect the level of intake, however animals fed diets with fumaric acid ingested higher amount of dry matter (DM), organic matter (OM), digestible OM and neutral detergent fibre (NDF) than those fed chlortetracycline diets and higher quantity of DM and OM than those fed bacitracin feeds. DM, OM and NDF digestibility were improved by bacitracin, but the latter just when compared to fumaric acid or chlortetracycline, and it tended to show the same effect in relation to control diet.

Caecotrophes DM excretion was similar in all diets, while caecotrophes nitrogen excretion was higher when animals were fed diets with fumaric acid or bacitracin.

PATHOLOGY

Mixomatosis and VHD combined vaccination. An innovative approach in rabbit production

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Combined vaccination against myxomatosis and VHD represents an innovative approach in rabbit production. Safety of the vaccine has been tested according to the European legislation in force. Vaccine strain SG33 did not show any spread amongst SPF rabbits in laboratory conditions, no reversion to virulence, and no influence upon humoral immunity. The administration of a double dose of the combined vaccine to females, had no influence upon pregnancy and progeny. Challenge tests in which virulent strains of the mixomatosis and VHD viruses were used, in laboratory conditions, demonstrated the effectiveness of the vaccine.

Evolution of rabbit epizootic enterocolitis in open air units

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Mortality by rabbit epizootic enterocolitis has been recorded in two open air units. One of these did not received any pharmacological treatment; the second received a pelleted feed medicated with reduced doses of tiamuline and apramycin (both 25 mg/Kg) for three weeks after weaning and half dose for the fourth week. In the year 2000 mortality was still high (38.6% ± 10.4) in the no treatment unit,

though lower than the one observed the previous year: But in the year 2001 the decrease was sensible ($10.1\% \pm 6.6$) and lower than 7% from the month of July. In the unit receiving antibiotics, the decrease was from $10.2\% \pm 7.1$ to $7.5\% \pm 6.3$. The decrease of the infection in summertime was confirmed, showing it is a constant seasonal effect. The general trend is to a spontaneous reduction, along the years, of the epizootic infection.

Incidence of tularemia in lagomorphs in the Comunidad Foral of Navarra

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Tularemia or Rabbit Fever is a natural infection of rodents and lagomorphs, that is able to transmit to human, and it is caused by *Francisella tularensis*. It is very important due to its health impact and increasing incidence in some regions of Spain. The aim of this study is to determinate presence of *F. tularensis* in lagomorphs in Comunidad Foral of Navarra (Spain). 198 samples were incubated in Thayer Martin modified medium at 37°C in aerobic conditions for 2-4 days. All of the 198 samples were negative. . Although this result doesn't allow us to ensure the absence of this pathogen in Comunidad Foral of Navarra, it will be possible to reach a maximum global prevalence of 1.5%.

Effect of sampling size on detection and prevalence determination of rabbit diseases.

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The objective of this contribution is to describe the capital importance of sampling methods when we design an experiment oriented to two basic targets: determination of disease prevalence and detection of disease.

Representativity of a sample is determined by two basic conditions: randomize (each animal has same chance of taking part of the sample) and homogeneity (proportions of intrinsic characteristics of population must be similar in the sample). For this reason it is important to use a correct sampling method and to select an adequate sample size.

So we consider than it is necessary to know the existence of possible sampling errors, incorrect use of data collected, calculation of accepted error, making stratified samples and to adjust sample size.
